The TECHNOLOGY DEPARTMENT
Chemical Age

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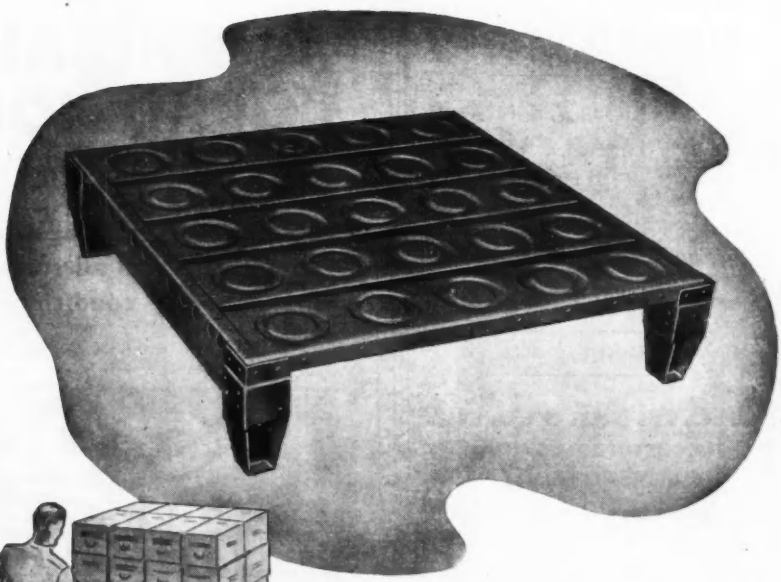

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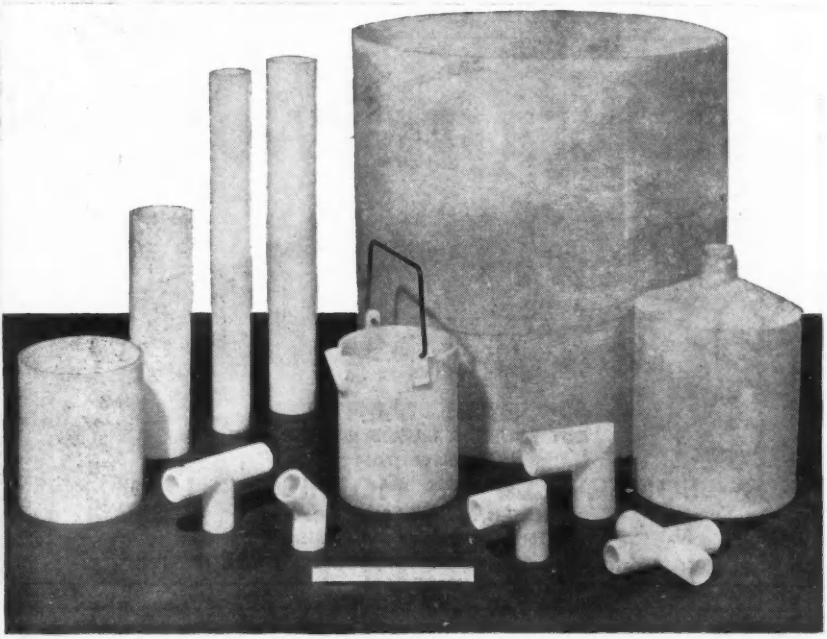

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The
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Science Themes at the Festival

WHEN it was announced, during the latter half of 1949, that a large part of the country's resources—of intellect, constructive capacity and money—would be preoccupied with creating a modern counterpart of the Great Exhibition of a century before, one of the common reactions was incredulity. The advisability of holding a Festival of Britain at a time less appropriate to festivity than to hard work is still open to doubt; but, since there is no longer anything tentative about the proposals, it is satisfactory to know that the plans formulated so far are of a kind to ensure that the 1951 Exhibition will be a really expert presentation of some characteristic quality and achievement which we need have no diffidence in publicising.

That assurance can be taken from the first fairly detailed account which has now been offered by the Festival authorities, of the organisations expected to collaborate and the character and scope of the exhibitions, which will occupy not only the Thames-side sites but also the Science Museum in South Kensington, the Kelvin Hall, Glasgow, an aircraft carrier and a mobile road assembly. All those locations, it is evident, will be barely sufficient to house comfortably even the review of scientific achievement which, in recognition of the current public taste for having abstruse things made comprehensible, is evidently going to predominate in the impressions which the Festival will convey.

The 1951 Exhibition has, of course, very much wider terms of reference. It is to celebrate also British achievements in the arts, science, technology and industrial design, but that does not dismiss the current evidence that science and technology, perhaps because they are thought to be more apt for tangible presentation, are to afford the memorable themes. The ambitiousness of such an undertaking would give rise to doubt whether any individual body—in this instance the Council of Science and Technology—would be capable of handling it adequately. The council, however, is fortunately a body of experts and will be guided by no less than 16 specialist panels, every member of which is an authority in one or other department of science. The reputations of many who have been mentioned as intimate collaborators render it highly unlikely that the displays will fail to present a fully balanced picture of the real

On Other Pages

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values of British research workers' achievement.

Notwithstanding the dramatic possibilities of many of the stories which go to make up the main narrative of British scientific achievement, even in the relatively fleeting period since sciences were conscripted for war purposes, the science and technology council will have one of the hardest selection tasks of any. The intention is that each theme shall be portrayed, pictorially or by physical examples, in a way which will make evident to all the main steps in the investigational or development work and the fruits which they have borne in civilised affairs. Because one of the problems of such an exhibition is to keep steady the flow of visitors passing through, captions and printed explanations are to be kept to the minimum. Graphs and comparatively elaborate diagrams will presumably come under the same ban, so that the task of giving adequate exposition even of such a subject as the use of radioactive "tracer" materials would call for the combined qualities of scientist and publicist. There are fortunately among the leading figures in contemporary chemistry and physics several who have shown a quite exceptional ability to reduce the remote and the abstract to comprehensible human terms, without concealing the essential qualities, and most of them are known to be helping to prepare next year's show.

While the prime aim of any expositions of this kind must be to make themselves intelligible to all and sundry, it would be surprising if a festival on this scale did not attract numbers who look for a more advanced representation of subjects of which they already know the rudiments. It was presumably with them in mind that the planners of the exhibition provided for the inclusion, at South Kensington, of an integrated presentation of one theme fundamental to much of the progress recorded elsewhere, the steps by which the nature and architecture of matter are being revealed. The plan here—as described by Sir Edward Appleton—will be to lead the visitor by easy stages to view the inwardness of relatively familiar solids, liquids and gases as they are translated into their molecular and atomic components, and so to the fundamental particles of the atom and finally to the inner structure of the nucleus itself. Here the model and advanced camera techniques will evidently be the only practicable way of making the story comprehensible.

Notes and Comments

North Western Engineers

THE continued predominance of the North-West as a spiritual and traditional homeland of chemical engineers was attested at the meetings in Manchester on February 3 of the virile North-Western branch—"the branch"—of the Institution of Chemical Engineers. The attendance from places as distant as London of people who are helping to make chemical engineering history and of Sir Wallace Akers, to give a new perspective of the chemical engineers' next responsibility—atomic energy—testified to the undiminshed influence of the Manchester school. It is, however, characteristic of chemical engineers not to meet merely for the purposes of mutual admiration. In that tradition was the pointed reminder given at the annual dinner by the national president (Dr. D. M. Newitt) that Manchester's fine record of education in technology displayed one surprising omission. Manchester still lacks a university Chair in Chemical Engineering.

Welding Aids to Production

THE timely "Research and Production" exhibition, staged by the British Welding Research Association at its London headquarters this week, well illustrated the importance of modern welding processes in the engineering industries generally and in chemical engineering in particular. That the association is keeping abreast of the growing demands for technological guidance from industry and adapting its research to all the "new" metals, was acknowledged by Sir Ben Lockspeiser, secretary of the DSIR and himself an engineer, who performed the official opening of the exhibition. He foresaw the increasing closeness of the links between the securing of export markets and the work of such associations as the BWRA. He was quite sure that the money spent and being spent on welding research would be returned to industry many times over. Industry's contribution to the association's funds had enabled it to spend on profitable research in 1949 something like £50,000. The DSIR contribution to the same end matches whatever is subscribed by industry. Meanwhile, industries were asking for researches in welding subjects which would almost double the present annual expenditure of the BWRA. He gave his assurance that the DSIR would not stint its support, even to that amount, "if industry showed willing."

Canada's Water Power

THE rapidly changing character of Canada, which some are still tempted to picture in the context of grain lands, prairies and forests, seems to be the subject of nearly all the news from the Dominion. The effect of them all is to present a story of development of industry and resources having its only close counterpart in the U.S.A. Dependent on no one for its food, and with great power sources—native petroleum and electricity—continually yielding new energy and promising much more, Canada's future as a great industrial nation cannot be in much doubt. The all-important contribution to the growing industrial character is, of course, Canada's rapidly increasing hydro-electric capacity, which now totals more than 11.6 million h.p., and the existence of vast untapped reservoirs of power. Developments in an advanced stage of construction are expected to add, within the next two years, 1.5 million h.p. and there are long-range plans for the exploitation of other great sources of water power. These figures, reported by the Canadian Department of Mines and Resources, are more than justified by the great demand for primary power, which last year increased by a further 3 per cent. Aluminium production, dependent on the harnessing of vast hydro-electric energy, will benefit greatly by

the development of these plans. The Aluminium Company of Canada is carrying out its own investigations to establish soon a large high-head plant on a coastal inlet. To do this it may divert water from the headwaters of the Fraser River by a tunnel through the Coast Range. The chemical and allied industries, as well as food production, increasingly dependent on electrical and electrolytic processes, will undoubtedly receive an important stimulus from this work to make full use of the same natural gift, here of gigantic proportions, upon which was founded most of Italy's earlier importance in chemistry and metallurgy.

Neutron Treatment of Diamonds

THE patent described elsewhere in this issue relating to neutron treatment of diamonds and other gems, primarily to change their colour (and their value) is of great theoretical interest because of the suggested likelihood that properties other than colour can be modified. While numerous attempts have been made to synthesise the diamond and to increase its hardness, no economically feasible process has yet been evolved since the time when R. H. Marsden and Moisson made their classical attempts. It is probable, however, that true diamonds of synthetic origin are to-day somewhat nearer realisation than formerly, owing to the great advance made in the production and use of extremely high pressures and temperatures. Professor Nahmias, in his specification, mentions the possibility that certain impurities may act as catalysts in the conversion of graphite to diamond, thus evoking the prospect of catalytic action effecting purely physical changes, as distinct from the well known chemical effects. The subject matter appears to lie mainly in the realm of theoretical possibilities, and these are generally not patentable. The comment of diamond experts is that until further experimental investigation is undertaken it is difficult to determine the practical possibilities of this patent, although there is no doubt at all about the purely scientific and theoretical interest. The fact that the patent process requires the use of an atomic pile obviously greatly diminishes practical commercial interest; but, viewed as an adjunct to the extremely wide possibilities of effecting vital changes of materials by neutron bombardment, the theme seems to deserve close attention.

I.C.I. as Publisher

REFERENCES to I.C.I., Ltd., as "the great chemical combine," or sometimes "colossus"—with equal alliterative effect—have been common during the current political spate. It seems to occur to no one to identify I.C.I. as a great publishing undertaking, which in fact it is. The evidence of that was shown last year in an exhibition which, held primarily for its own staff, nevertheless aroused a good deal of public interest. (THE CHEMICAL AGE, *60*, 879.) A larger and more popular form of display of I.C.I's technical literature is to be held in London at the Academy Cinema Exhibition Hall, Oxford Street, from March 6-17. The sharing of results of research and scientific knowledge will be shown by publication of papers delivered by experts to various associations, while the production of literature describing a recent discovery will be traced from the scientist's laboratory notebook to the printing press. I.C.I. publishes new technical literature at the rate of two publications a day, or 800 a year, and from two to four million copies are printed annually. Some will regret that some examples of the company's publicity series such as "Ancestors of Industry"—which brought a new quality to advertising—cannot be included. They may not be "technical literature" but their value as popular enlightenment is not in doubt.

Industrial Finishes Exhibition

THE first British Industrial Finishes Exhibition will be held in London at Earls Court from August 30-September 7. Sir Edward Appleton, principal and vice-chancellor, Edinburgh University, is a member of the honorary council.

FERTILISER RESEARCH ASSOCIATION

Initial Group's Appeal for Support

THE decision to proceed with the formation of a co-operative research group for the fertiliser industry is confirmed by the circulation, last week, of articles of association of the Fertiliser Research Association, to be formed as a company limited by guarantee.

Nearly a year has elapsed since the proposal to form such a research body was made public (THE CHEMICAL AGE, *60*, 497). Since then the scope of activities originally proposed has been broadened to cover "all fertilisers," and not merely phosphate and compound fertilisers.

This policy seems to have been influenced by the conditions associated with receipt of a Government grant, such as is awarded to a number of other research associations. The grant will be received through the Department of Scientific and Industrial Research, whose assistance in preparing the draft rules, etc., is acknowledged in a very informative prospectus which is being circulated to potential members. This mentions that I.C.I., Ltd., and Fisons, Ltd., are not intending at this stage, to become members.

Charge on Tonnage

The Formation Committee observes, in this context, that:—"Provided other prospective members, who provisionally offered to support it are still prepared to do so, the committee considered that a basic subscription plus the flat rate subscription of 3d. per ton will raise an adequate sum, together with the DSIR grant to enable useful work to be started."

The basic annual subscription is likely to be £50, which members will have to contract to pay for at least five years. Members joining three months after the association has been formed will be required to pay an entrance fee also.

The committee foresees the possibility that, as subscriptions are to be on a tonnage basis, it may be possible for the subscription of an individual member to drop below his guaranteed minimum if the overall tonnage of subscribing members has increased.

The committee's appeal for support from other fertiliser manufacturers emphasises the need for "new and possibly major technical developments," and expresses the view that, individual research undertakings are unlikely to be large enough to solve some of the industry's fundamental problems.

"What is urgently required," says the appeal, "is a powerful joint attack upon problems of raw material supplies and of manufacturing final products that are more effective in the soil. This is likely to be long-term research and for that reason it should start as soon as possible. In addition there are immediate problems in the study of many little understood factors which influence present manufacturing methods."

First Members

It is indicated that the programme will include fundamental research, as well as technical and process problems and the study of new methods suggested by research in other parts of the world and the advances made by allied organisations, such as the Agricultural Research Council.

The Formation Committee's manifesto is signed by the following:—

J. ANGUS (Scottish Agricultural Industries, Ltd.), C. H. J. CORBETT (Edward Webb & Sons (Stourbridge), Ltd.), W. B. DAVIES (Lawes Chemical Co., Ltd.), D. P. HOPKINS (H. & T. Proctor, Ltd.), E. P. HUDSON (Scottish Agricultural Industries, Ltd.), G. F. NEW (general manager and secretary, Fertiliser Manufacturers' Association), J. T. PROCTOR (Hy. Richardson & Co. Ltd.), J. W. PARKES (W. & H. M. Goulding, Ltd.), E. M. REID (Richardsons Chemical Manure Co., Ltd.), A. T. VERNON (Cannock Agricultural Co. Ltd.).

World Food Problems

THE greatly heightened attention being paid to fuller production and distribution of the world's food can be largely attributed to the untiring efforts of Lord Boyd Orr, who will preside at a conference in London on March 4 and 5, on "The World's Food and Britain's Needs."

The conference is being organised by the Association of Scientific Workers, and a number of prominent scientists will take part in the discussions. Dr. Julian Huxley will deal with the population question; Sir R. George Stapledon with means to enable Britain to meet the needs of her own people.

"Food From Waste Materials," will be the subject of a talk by Mr. Ritchie Calder who has recently returned from studying desert reclamation in North Africa. A final survey of the evidence provided by the conference will be made by Mr. F. le Gros Clark.

Sulphuric Acid Statistics

U.K. Production and Consumption in Last Quarter

THE classified summary below of the figures for the quarter ended December 31, 1949, issued by the National Sulphuric Acid Association, Ld., reveals that there was an increase in production and consumption in the United Kingdom of sulphuric acid and oleum compared with the July-September period. Comparative figures were: Production: 435,190 tons, against 402,926 tons in July-September. Consumption: 442,948 tons, compared with 399,850 tons in July-September. Noteworthy increases in consumption of individual items in the last quarter, compared with the third three-months' period were:—Dyestuffs and Intermediates 18,816 tons against 15,738 tons: hydrochloric acid 16,363 tons (15,133); iron pickling 24,468 tons (22,175); oil refining and petroleum products 13,906 tons (11,108); paint and lithopone 30.860 tons (18,836); rayon and transparent paper 51,978 tons (40,116). Sulphate of ammonia showed a slight decrease in consumption, with 63,815 tons (64,682), as also did superphosphates 121,545 tons (126,643).

Total production in the United Kingdom of sulphuric acid and oleum for the full year 1949 was 1,791,740 tons, compared with 1,601,438 tons in 1948 for the United Kingdom and Eire combined. Total consumption in the U.K. during 1949 was also up on the 1948 figure for the U.K. and Eire combined, with 1,677,509 tons (1,613,208).

PRODUCTION OF SULPHURIC ACID AND OLEUM

(Tons of 100% H_2SO_4)

	Chamber only	Contact only	Chamber and Contact
Stock, Oct. 1., 1949 ...	31,252	35,873	67,125
Production	184,887	250,303	435,190
Receipts	49,938	12,224	62,162
Oleum feed	—	2,681	2,681
Adjustments	—67	—19	—86
Use	110,166	97,423	207,589
Despatches	122,131	171,935	294,066
Stock Dec. 31, 1949 ...	33,713	31,704	65,417
Total capacity represented	199,930	264,240	464,170
Percentage production...	92.5%	94.7%	93.8%

RAW MATERIALS

(Tons)

	Pyrites	Spent Oxide	Sulphur & H_2S	Zinc Concentrates	Anhydrite
Stock Oct. 1, 1949	70,676	173,778	78,101	45,622	750
Receipts ...	41,149	61,327	71,865	37,588	42,472
Adjustments	+299	+558	—248	—94	—
Use ...	58,353	48,961	81,937	43,856	42,512
Despatches	134	7,278	32	10	—
		147†			
Stock Dec. 31, 1949	53,637	179,277	67,749	39,250	710

† Used at works for purposes other than sulphuric acid manufacture.

CONSUMPTION OF SULPHURIC ACID AND OLEUM UNITED KINGDOM

	Tons 100% H_2SO_4
Accumulators	2,668
Agricultural purposes	726
Bichromate and chromic acid	3,117
Borax and boracic acid (" unclassified ") ...	
Bromine	2,917
Chlorsulphonic acid (" unclassified ")	
Clays (fuller's earth, etc.)	2,687
Copper pickling	719
Dealers	4,724
Drugs and fine chemicals	2,735
Dyestuffs and intermediates	18,816
Explosives	3,290
Export	1,010
Formic Acid (" unclassified ")	
Glue, gelatin and size	41
Hydrochloric acid	16,363
Hydrofluoric acid	2,254
Iron pickling (incl. tin plate)	24,468
Leather	1,734
Metal extraction	430
Oil refining and petroleum products	13,906
Oils (vegetable)	2,694
Oxalic, tartaric and citric acids (" Unclassified")	
Paint and lithopone	30,860
Paper, etc.	891
Phosphates (industrial)	1,618
Plastics, not otherwise classified	5,450
Rare earths (" unclassified ")	
Rayon and transparent paper	51,978
Sewage	2,819
Soap and glycerine	2,920
Sugar refining	184
Sulphate of alumina (" unclassified ") ...	
Sulphate of amonia	63,815
Sulphate of barium	1,146
Sulphate of copper	5,353
Sulphate of magnesium	1,617
Sulphate of zinc	883
Superphosphates	121,545
Tar and benzol	4,397
Textile uses	6,298
Unclassified: Uses known	24,194
Uses unknown	11,681
TOTAL	442,948

Fewer Dollars for Oil Plant

ECA funds for expansion of the Shell Haven oil refinery at Stanford-le-Hope, Essex, have been reduced by $7,588,000 (about £2.7 million), three-quarters of the sum originally proposed. The ECA stated that this had been done at the request of Britain. The revised plans will reduce the potential distillation capacity to 40,000 barrels a day and dispense with the catalytic cracker.

THE GROWTH OF CHEMICAL INDUSTRIES

Some Deterrent Effects of Government Controls

AT the end of the war the chemical industry was faced with three main tasks, states the ABCM's "Report on Chemical Industry, 1949."* First it had to deal with arrears of maintenance of plant and services and so to maintain existing plant in full production. Next came the task of erecting new plants or extending existing ones in order: (a) to provide other industries with the chemicals needed to meet essential home requirements and to increase their export of finished and semi-finished goods; (b) to increase direct export of chemicals for re-establishment of industry in other countries and generally to bring in foreign currency. The third task was to exploit discoveries or inventions ripe for development at the outbreak of hostilities and those made during the war.

The principal factor retarding speed of progress in any one project has probably been the operation of controls involving several Ministries—states the report. The nation's limited resources in manpower and constructional materials make inevitable a measure of Government supervision over schemes of industrial development, and the industry willingly responded to the Government's appeal, in the autumn of 1947, for restraint in capital expenditure.

All the same, it is held that in considering the schemes submitted there was not adequate appreciation either of the basic nature of the industry and its importance to other industries or of the time that must necessarily intervene between the issue of licences and the completion of projects.

Replacements Overdue

The report expresses the hope that plans are well advanced for eliminating all controls and permit systems no longer essential.

Schemes for the replacement of existing plant because it is in a bad physical condition or is uneconomic have often had to be postponed. There is a limit to the extent to which a chemical manufacturer can "make do and mend," particularly because many plants were perforce allowed during the war to fall behind the stage of efficient maintenance. Moreover, the longer repairs are deferred, the greater the damage to be made good.

Persistent lack of attention to major repair work must lead to serious curtailment of production and also to increased industrial hazards. The importance of adequate maintenance facilities appears not always to be appreciated by Government departments, and several schemes for improving maintenance workshops have been rejected.

Many schemes for increasing research and development facilities have been deferred by the Government, even when they have a direct bearing on increasing the efficiency of existing processes. Equally, if not more, serious is the long-term effect on new research and development.

Impediments

Time lost on research may never be regained; the industry has already a considerable leeway to make up compared with the American manufacturer, who has suffered much less from difficulties, delays and frustrations than British industry, both during and since the war.

Government departments have discouraged the provision of additional office accommodation and amenities, even when these are essential to additional staff and workpeople for the design, building, operation and control of increased production, and even when the existing facilities have been condemned by H.M. Factory Inspectors. After the war until early in 1948 structural steel authorisations were totally inadequate and apparently unrelated to requirements for approved and licensed schemes. The position has improved of late, but it would be a further help to industry if steel allocations could be made earlier than at present.

The report deals at length with the subject of plant and equipment. It notes that, although no direct control has been exercised on schemes involving only plant and equipment, delays have occurred for two reasons. In the first place, many engineering contractors receive bulk authorisations for steel needed for fabrication of their normal products; much chemical plant falls outside this category and chemical manufacturers have therefore had to obtain a supplementary authorisation to be re-allocated to the engineering contractors. This has led to serious delay in delivery of equipment, inevitable while the present system of allocation continues.

*The Association of British Chemical Manufacturers' report was reviewed in part last week (62, 183-188).

Owing to the corrosive nature of some chemical products, stainless steel is often essential for the construction of plant. Great shortages have occurred in the past and it is not known whether adequate supplies will be available in future. Priority should be given to those uses of stainless steel to which there are no practical alternatives.

Equipment Withheld

In the second place, serious delays also arise because the engineering industries, which include the manufacturers of chemical plant, were given large export targets by the Government immediately after the war; as a consequence equipment badly needed in the United Kingdom has gone to overseas competitors. The industry was thus denied plant required for its own rehabilitation and development and to capture markets abroad, while firms in those countries have been able to set up manufacture, thus automatically curtailing our possible exports.

As chemical plant may easily produce several times its own value in a year, the wisdom of the above policy can be legimately questioned. The position was improved by the Government's instructions given in the late autumn of 1947, the full effect of which has not yet been felt because of the export commitments of the plant manufacturers.

While the general position is better, delivery dates of one or two years ahead are still common. The absence of some small but essential part has sometimes kept idle for months important new plant for producing a badly needed product.

The ABCM appreciates the co-operation received from the British Chemical Plant Manufacturers' Association, the Ministry of Supply and the Board of Trade in its attempts to deal with serious delays.

It was at one time hoped to mitigate the difficulties due to slow delivery of plant by the reparations scheme on which the industry spent much time and money, sending many expert teams of inspection to Germany; it expected to solve some of its equipment problems, if only on a temporary basis, by the use of such plant. In fact, very little has become available, and in consequence several manufacturers have been badly handicapped and time and money have been wasted.

The chemical industry is well aware of this country's critical dollar shortage. It is therefore the more appreciative of the Government's action in permitting purchase from the U.S.A. of essential chemical plant that could not be obtained elsewhere. It must be emphasised that in many instances these purchases will themselves effect much more than an equivalent dollar-saving by making it possible to produce here vital chemicals hitherto to be bought only in dollar areas.

Summarising some of the principal factors in raw material supplies, in their relation to the progress of development, the report reflects the uncertainty regarding sulphur-containing materials, more particularly of spent oxide, dependent upon the operations of the gas industry.

In 1938 about 75,000 tons of sulphur were used for the manufacture of sulphuric acid. By the end of 1949 this rate of consumption will have risen to some 340,000 tons per annum. This increase, the report observes, is due mainly to war-time factors —political, strategic and economic—which led the Government from 1940 onwards to erect sulphur-burning plants on their own behalf and to support the erection of others by the industry.

Material Supplies

Information obtained from the industry by the ABCM shows that generally no special supply difficulties are expected over additional requirements for most other raw materials. Anxiety has, however, been expressed about the following:—

(1) Borax, because of the dollar shortage; (2) Cadmium metal; (3) Certain coal tar products, such as anthracene, naphthalene, meta-xylene and meta-xylenol; (4) Hard coke for the production of ammonia and methyl alcohol; (5) High acetyl cellulose acetate for X-ray film base; (6) Monazite sand, required for the manufacture of cerium and thorium compounds; (7) Naphthenic and stearic acids; (8) Palm kernel oil for the production of long chain alcohols; (9) Pig lead; (10) Tobacco offal for nicotine production.

The present shortage of packaging materials often results in inferior packing and consequent damage to goods in transit. Apart from the losses involved, both these defects have a bad psychological effect on the customer.

The report stresses the essential character of adequate supplies of fuel of the right quality at the right price. Power cuts had peculiarly unfortunate results for the chemical industry. They increase industrial hazards and may introduce new ones; they may cause extensive loss of raw materials and labour, with consequent effects on production, because chemical processes, almost without exception, depend on strict control of reaction times and operating temperatures.

(Tables showing effect of development schemes are over'leaf)

SUMMARY OF CHEMICAL DEVELOPMENT SCHEMES

SUMMARY OF CHEMICAL DEVELOPMENT SCHEMES

Group 1—Sulphuric acid.
,, 2—Alkalis (including chlorine).
,, 3—Other inorganic acids and salts (including carbide).
,, 4—Industrial gases.
,, 5—Nitrogen fertilisers.
,, 6—Soluble phosphate fertilisers.
,, 7—Other chemical fertilisers.
,, 8—Heavy organic chemicals.
,, 9—Chemicals for pharmaceutical and veterinary products.
,, 10—Miscellaneous fine chemicals.
,, 11—Dyestuffs and intermediates.
Sub-Group 12A—Coloured pigments
,, 12B—Other pigments (including whites and red and orange lead).
Group 13—Explosives.
,, 14—Chemicals for pest control and for agricultural and horticultural purposes not elsewhere included.
,, 15—Plastic materials and synthetic resins.
,, 16—Miscellaneous chemicals.
,, 17—Coal tar distillation products§.
Additional Group (18)—General services and Amenities.

Group	1	2		3		4		5			6		7		8		9		10
	No. of Firms	Schemes in Progress		Schemes Awaiting Licence		Schemes still Tentative		All Schemes		Amount Already Spent	Present Productive Annual Capacity		Total Productive Annual Capacity on completion of Schemes		Decrease in Annual Imports		Increase in Annual Exports		Additional Employees
		No.	Est. Cost (in £000's)	No.	Est. Cost (in £000's)	No.	Est. Cost (in £000's)	No.	Est. Cost (in £000's)	(in £000's)	Tons (in 000's)	Value (in £000's)	Tons (in 000's)	Value (in £000's)	Tons (in 000's)	Value (in £000's)	Tons (in 000's)	Value (in £000's)	
Group 1	48	42	2,872	6	1,370	38	6,877	86	11,119	1,014	1,476	9,545	2,134	14,064*	—	—	—	10	480
,, 2	7	17	26,723	5	8,381	16	3,996	38	39,100	11,411	1,759	22,120	2,611	32,952	—	21	—	4,250	4,170
,, 3	84	73	6,016	11	2,045	58	5,675	142	13,736	2,652	2,561	52,114	3,354	75,821	—	5,401	—	3,858	2,850
,, 4	7	3	2,265	—	—	9	2,021	12	4,286	860	—	8,608	—	11,391	—	160	—	240	1,000
,, 5																			
(a) Synthetic nitrogenous fertilisers.	2	—	—	—	—	3	3,590	3	3,590	—	920.8	10,755	1,183	13,702	—	—	—	1,000	280
(b) By-product ammonium sulphate.	—	3	138	1	300	2	110	6	548	61	—	—	—	—	—	—	—	—	—
Group 6	12	19	2,332	—	—	12	136	31	2,468	105	1,299	7,762	1,453	9,297	—	563*	—	—	— 20
,, 7	1	—	—	—	—	4	11,600	4	11,600	—	172	2,626	710	10,171	—	4,100	—	1,360	1,680
,, 8	40	72	27,763	7	5,478	49	9,553	128	42,794	10,444	848	62,572	1,688	136,646	—	9,153	—	8,538	3,880
,, 9	52	48	3,642	13	385	42	3,104	103	7,131	1,463	—	32,144	—	56,119	—	975	—	8,956	2,110
,, 10	52	37	1,351	3	93	17	418	57	1,862	407	—	14,833	—	23,038	—	1,681	—	4,063	1,230
,, 11	26†	26	11,489	12	3,094	21	1,798	59	16,381	3,155	195.7 50‡	38,308 18,300‡	237.9 66.8‡	52,610 26,730‡	—	1,219	—	4,729	2,330
Sub-Group 12A	38	34	1,612	2	19	16	297	52	1,928	738	41,271	6,727	53.152	8,593	—	—	—	440	460
,, 12B	22	13	1,794	1	9	13	1,412	27	3,215	304	268.69	21,710	333.99	27,147	—	10	—	1,303	650
Group 13	1	—	—	—	—	10	2,031	10	2,031	—	—	10,394	—	12,743	—	—	—	—	— 1,330
,, 14	29	7	184	3	276	10	226	20	686	23	86.415	6 763	96.812	9,390	—	—	—	341	270
,, 15	38	55	17,447	4	533	30	3,974	89	21,974	7,859	185.738	37,741	339.189	71,881	—	3,266	—	7,022	4,500
,, 16	17	15	532	2	130	9	1,285	26	1,947	292	32,826	2,717	56.978	4,906	—	1,810	—	1,028	640
Additional Group (18)	2	10	2,840	3	96	27	2,522	40	5,458	2,069	—	—	—	—	—	—	—	—	—

* Calculated as 100% H_2SO_4. † 15 dyemakers. ‡ Dyestuffs only.

§ Coal tar distillation products have been excluded from this inquiry by agreement between the Board of Trade and the Ministry of Fuel and Power.

Summary of Forward Plans—Cost and Expected Returns

(All values in £000's)

Group	No. of Firms	Schemes			Present Annual Capacity		Ultimate Annual Capacity		Additional Employees	Imports—Decrease in Value p.a.	Exports—Increase in Value p.a.
		Number	Total Cost	Already Spent	Tons	Value	Tons	Value			
1	48	86	11,119	1,014	1,476,000	9,545	2,134,000	14,064	480	—	10
2	7	38	39,100	11,411	1,759,000	22,120	2,611,000	32,952	4,170	21	4,250
3	84	142	13,736	2,652	2,561,000	52,114	3,354,000	75,821	2,850	5,401	3,858
4	7	12	4,286	860	(a) —	8,608	(a) —	11,391	1,000	160	240
5	2	3	3,590	—	920,800	10,755	1,183,000	13,702	280	—	1,000
6	12	31	2,468	105	1,299,000	7,762	1,453,000	9,297	+ 20	563	—
7	1	4	11,600	—	172,000	2,626	710,000	10,171	1,680	4,100	1,360
8	40	128	42,794	10,444	848,000	62,572	1,668,000	136,646	3,880	9,153	8,538
9	52	103	7,131	1,463	(a) —	32,144	(a) —	56,119	2,110	975	8,956
10	52	57	1,862	407	(a) —	14,833	(a) —	23,038	1,230	1,681	4,063
11	26	59	16,381	3,155	195,700	38,308	237,900	52,610	2,330	1,219	4,729
12A	38	52	1,928	738	41,271	6,727	53,152	8,593	460	—	440
12B	22	27	3,215	304	268,690	21,710	333,990	27,147	650	10	1,303
13	1	10	2,031	—	(a) —	10,394	(a) —	12,743	+1,330	—	—
14	29	20	686	23	86,415	6,763	96,812	9,390	270	—	341
15	38	89	21,974	7,859	185,738	37,741	339,189	71,881	4,500	3,266	7,022
16	17	26	1,947	292	32,826	2,717	56,978	4,906	640	1,810	1,028
17		Outside	scope of	enquiry							
18	2	40	5,458	2,069	—	—	—	—	—	—	—
Total	(b) —	927	191,306	42,796	9,846,440	347,439	14,231,021	570,471	25,180	28,359	47,138

(a) Tonnage figures are not applicable to these Groups.
(b) Many firms have schemes in more than one Group.

GELATINE & GLUE RESEARCH

Laboratory Work Begins

THE research programme of the British Gelatine and Glue Research Association has been agreed with DSIR and work on fundamental problems of the industry has begun at the association's laboratories, which have been established at 2/4 Dalmeny Avenue, Holloway, London, N.7. Special emphasis is to be laid on materials and consumer research.

The first numbers of the association's *Bulletin* and *Abstracts* have already been published and the initial meeting of the research panel was held in January.

Regulations for associate membership, which is open to users of gelatine and glue and to manufacturers of equipment for the industry, are now available and can be obtained either from Kidson's, Taylor & Co., Sardinia House, 52 Lincoln's Inn Fields, London, W.C.2, or from the director at the laboratories.

Controlled Blasting

ELECTRIC blasting caps of fractional-second delay have been developed recently in the U.S.A. and are claimed by the manufacturers, Olin Industries, Inc., to reduce vibration from blasting operations and to reduce costs.

Instead of firing one large charge of explosive at one time and setting up one large shock wave, it is possible with the use of the new blasting caps to break up a large charge into smaller portions and fire each at fractional-second intervals.—reports the *Midwest Engineer* (Vol. 2, 13).

The metal caps are accurately timed to permit 10 periods of delay. Eleven-delay periods can be obtained by using the caps in combination with a ventless delay blasting cap. A delay number identifies the caps, which are also supplied with plastic covered wires and plastic shunts.

SUMMARY OF FORWARD PLANS

The ABCM report gives in the following table the increase of raw materials which the proposed expansions are estimated to require.

	Pyrites Tons	Spent Oxide Tons	Sulphur Tons
Consumption in 1948 ...	227,000	196,000	260,000
Increased quantities required per annum when above schemes are completed ...	189,000	82,000	120,000
Total	416,000	278,000	380,000

TECHNOLOGY AND PRODUCTION

N.-W. Engineers on Current Need for Specialists

CONFIRMATION of the contemporary belief that the well-being of Britain's production industries depended more than ever before on the fuller use of technology and technologists was offered in Manchester on February 3 by Dr. D. M. Newitt.

The president of the Institution of Chemical Engineers was speaking at the annual dinner, which followed the annual general meeting of the North-Western branch of the institution, delegates to which had earlier been welcomed by the Lord Mayor of Manchester and heard a review by Sir Wallace Akers, C.B.E., of possibilities in the development of atomic energy.

Dr. Newitt affirmed that a direct relationship could be discerned between an industry's productivity and the number of technologists it employed. It was one of the factors which helped to explain "the rather high productivity" of industries in the U.S.A. He had little sympathy, however, with the view that when chemical plant or technology was wanted here it was necessary to go to the U.S.A. for it. There was, he thought, some inclination here to be mesmerised by the great technological institutes of America, where chemical engineers were employed very much more freely than was possible here.

He considered that here the urgent need now was to increase the output of technologists, and especially of chemical engineers; and there was a complementary need for widespread technical education to ensure the availability of foremen and other ranks of the same quality. It was, he thought, surprising that Manchester, with its high standards of technological education, still had no university Chair in the very important subject of chemical engineering.

The clear responsibility to provide, in this country, greater facilities for the training of chemical engineering students rested, however, as much upon industries as on the universities. The former now had the opportunity to make an important contribution to that end.

Mr. E. J. Dunstan, re-elected as chairman of the North-Western branch, who presided at the dinner, supported the view that the advance in American industries had gained much of its force from the specialised approach. The obligation to specialise was evident in chemical engineering; no one today could hope to cope at the same time with the great developments in chemistry and in engineering and in that way become an expert chemical engineer.

In the wider view, he was convinced that Britain had the technologists of the right calibre and that the need now was to recapture that pride of achievement which impelled a man to do a little bit more and enabled the nation to do a very great deal more.

The chairman was responding to the toast of the North-Western branch, which Dr. Newitt had proposed. Mr. T. Penny proposed the health of the guests, for whom Sir Wallace Akers responded.

Monsanto Companies Join Forces in India

THE decision of the Monsanto companies in Britain and America to collaborate in India was made known on Wednesday. The announcement from Monsanto Chemicals, Ltd., in London, reveals that the new organisation, Monsanto Chemicals of India, Ltd., will be centred on Bombay and will be jointly controlled by the British company and by the Monsanto Chemical Company in America, whose president, Mr. W. M. Rand, will share responsibility with Mr. Edward A. O'Neal, Jun., chairman of Monsanto Chemicals, Ltd. The other directors named are E. A. Blair, J. W. Urban, Marshall E. Young, W. E. Daysh and B. K. Denton, of whom the last two will exercise local control in Bombay.

The immediate objective is to establish a selling organisation in India and later to manufacture chemicals based on indigenous raw materials.

Nuclear Research

The first Institute of Nuclear Physics in India was opened in Calcutta on January 11 by Madame Curie. This is one of 11 scientific institutions planned by the Government.

GOVERNMENT SCIENTISTS

Lack of Recruits for Higher Staff

TECHNICAL education and the position of scientists in the public service were particularly referred to by Sir John Anderson, president, at the luncheon following the annual general meeting of the Parliamentary and Scientific Committee held recently in London.

While agreeing that technical education admitted of many differences of opinion, Sir John said that he thought that it was generally agreed that there was a need in this country for institutions to do what the universities could not do technically, and to do it up to university standard in the field of technology.

There were, of course, difficulties, one of which was that technical education, unlike university education, fell within a departmental sphere and also that it was, to a large extent, a responsibility of local authorities.

Nevertheless, the fact that we had not got in this country institutions comparable with the Massachusetts Institute of Technology, or those of Charlottenburg and Zurich, was something of which we had to take note.

Interchange of Scientists

With regard to the position of scientists in public services, it has recently been represented to him that there was some feeling of discomfort and disquiet on the part of these scientists, and he thought that some review was justifiable. It might well be worth considering whether it was possible in the highest posts, such as those of scientific advisers to government departments and directors of research organisations, to have some system which facilitated interchange.

Sir Charles Darwin (director of the National Physical Laboratory) also referred to the position of scientists in Government service, and expressed gratitude for the system which enabled a limited number of special promotions to be given for scientific merit.

He did, however, feel alarm about the danger arising from the shortage of recruits for their staff, particularly the higher staff. They had at present no reserves and while it was possible to continue for the time being, this might later prove to be a calamity.

With regard to technical training, Sir Charles considered that serious thought should be given to the present inadequate arrangements for training engineers.

DISTRICT HEATING

Possible Saving of Fuel

THAT there is a case for the introduction of district heating, particularly in the new towns, is maintained by Mr. A. E. Margolis in a paper to be read next month before the Institute of Fuel.

District heating, states Mr. Margolis, has the advantage that in fulfilling its primary task of providing a centralised service it eliminates the smoke nuisance and improves living conditions.

The ease with which heat and power can be co-ordinated in this country is stressed and the warning given that power stations are approaching the limit of thermal efficiency.

Fuel costs and demand continue to increase and it is becoming difficult to find suitable sites for condensing stations with a sufficient supply of cooling water.

Gas and electric heating cannot solve the district heating problem, the author argues, because of their poor annual load factor and the high capital charges of installing additional plant capacity.

Remote Supplies

By combining exhaust-heat storage and thermal-electric storage, the range of district heating service can be extended to isolated groups of buildings, even to villages far from the heat-electric station.

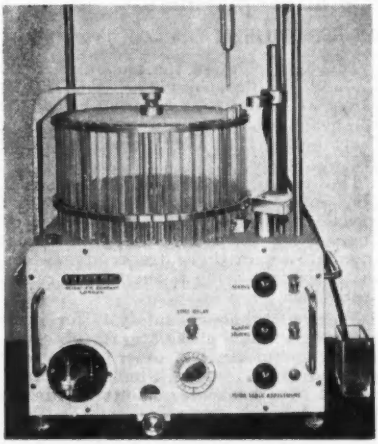
The application of district heating for a new town with a population of 40,000 is examined. A heat-electric station with a total electricity generating capacity of 60,000 kW can be installed, operating with an annual load factor of 58 per cent and an average thermal efficiency of 76 per cent. This would result in an annual saving of up to 79,000 tons of coal.

Power from Peat

ELECTRIC current obtained from peat for use on a commercial scale is said to have been produced by a new generating station at Clonlast, Offaly, Eire. Half the annual production of 2 million tons of machine-won peat would be used for this purpose, stated the Eire Minister for Industry and Commerce, Mr. Daniel Morrissey, at Galway last week.

It is estimated that Clonlast station will consume 120,000 tons of peat a year to generate 90 million units in that time. Two peat-fired stations of greater capacity are being built, the first of which should be in operation by 1952. Each station will work the peat from local bogs.

NEW AUTOMATIC FRACTION COLLECTOR



The base of the apparatus, containing the motor-operated collector unit and the weighing equipment

THE advantages claimed for the use of an automatic fraction collector in chromatography or fractional distillation are that, apart from supplying detailed information, it saves a great deal of labour and time, and provides consistently accurate and comparable data by avoiding the errors due to the human element. The one newly produced by the Shandon Scientific Co., London, illustrated here, is stated to be the first of this type to be manufactured in this country. It was, say the makers, designed with three objects in view: to provide a fully automatic machine; to incorporate in it all features necessary for accurate and safe operation; and to eliminate the necessity for expensive machines with 200 test tube capacity.

The machine will collect fluids in predetermined amounts which are adjustable anywhere between .5 and 15 gm. It consists essentially of a 11-in. diameter circular turntable which carries in one row 50 identical Pyrex test tubes.

The turntable is mounted on a rectangular base, measuring 15½ in. by 8 in. by 9 in. high, which houses the driving motor, the sensitive weighing mechanism and all the electrical gear. It carries three uprights to which the fractionating column can be attached.

Agate Bearings

The weighing mechanism consists of a precision weighing beam, provided with arrestment, which carries at one end a counterbalanced stirrup with a small overhead platform, and at the other end the weight pan on which weights are placed corresponding to the amount of fluid to be collected in each test tube. The whole weighing mechanism is mounted on agate bearings.

For collecting very accurate small fractions of .5 ml. or less the makers supply, as an extra, small calibrated capillary syphons for attachment to the fraction column. Where it is desired to collect automatically a larger number of fractions than 50, i.e., without manually replacing already filled test tubes, the machine can be used in multiple set-ups for collecting 100, 150 or 200 fractions.

Anodic Oxidation Standard

THE electrolytic process of anodising—anodic oxidation—developed after the first world war as a means of increasing the corrosion resistance of aluminium and aluminium-base alloys used in aircraft, is applied to-day in many industries, so that the formulation of a standard of practice was justified. Such a standard has now been published by the British Standards Institution, BS 1615, "Anodic Oxidation Finishes for Aluminium and Aluminium Alloys."

By suitable alteration of the operating conditions of the anodising bath, the properties of the film may be varied to suit the requirements of service conditions. The new standard covers the methods of testing to be employed and the performance requirements of films tested by the standard methods. It has been agreed that it is neither desirable nor practicable to standardise the details of the process by which the film is produced.

The characteristics covered in the British Standard are:—Thickness of anodic coatings, reflection factors, resistance to abrasion, and fastness to light. Work is still proceeding on resistance to corrosion.

Plastics Uses of Diallyl Phthalate

Aid to Production of Special Copolymers

From A SPECIAL CORRESPONDENT

THE monomeric compound, diallyl phthalate, [C_6H_4 ($COOCH_2$ CH : CH_2)$_2$] finds several direct applications in the plastics industry, notably as a low pressure laminating resin, as a casting resin and as a primary plasticiser for imparting low temperature flexibility and low water extraction. In addition, diallyl phthalate is proving important in the production of new copolymers, e.g., copolymerisation with diallyl phenyl phosphonate and other monomers to form so-called " tailored " polyesters.

Physical Properties

These can be made for specific requirements, providing the plastics technologist with a resin possessing the most desirable physical properties. This is well illustrated by the fact that in making glass fibre laminates with polyester resin, it is possible to match the refractive index to the glass cloth so as to give a transparent laminated sheet. The " tailoring " of resins made possible by copolymerisation undoubtedly greatly widens the scope of the plastics manufacturers.

Diallyl phthalate is a low viscosity liquid (12 centipoises at 12° C.) with a specific gravity of 1.120 at 20° C. Its mild, slightly lachrymatory smell does not cause unpleasant effects physiologically if handled with reasonable care. Manufacturers claim that it is not a primary irritant but advise care in handling to prevent long exposure of the skin to the liquid.

The pure monomer can be stored in metal drums and it is not corrosive to mild steel, stainless steel, aluminium, brass, copper or magnesium. Provided containers are not stored near steam pipes or exposed to temperatures above normal and the monomer is not exposed to light, there is no fear that it will gel. Mixed with catalyst, diallyl phthalate will usually commence to gel in 6-8 weeks at normal temperature.

Diallyl phthalate is insoluble in water but soluble in ketones, esters, ethers alcohols and aromatic hydrocarbons. The 30 per cent prepolymer or syrup is soluble in acetone or carbon tetrachloride and the fully polymerised resin is insoluble in all common solvents but slightly affected by chloroform and nitropropane.

The flash point of the monomer is 166° C., and the fire point 182° C. Boiling range at 4 mm. is as follows: below 156° C.—none; below 160° C. maximum 5 per cent; below 170° C. 95 per cent; above 175° C., none.

The vapour pressure at 150° C. is 2.4 mm. mercury and 27.0 mm. at 200° C. Surface tension at 20° C. is 39° per cm. Commercial forms of diallyl phthalate usually contain slight traces of free acid, the maximum being about 0.1 per cent as acetic acid.

The best known catalyst for polymerising diallyl phthalate is, of course, benzoyl peroxide, but other peroxy compounds, such as di-t-butyl peroxide, t-butyl perbenzoate, buty-t-hydroperoxide, lauroyl peroxide and di-t-butyl diperphthalate can also be employed. About 2-5 per cent of the catalyst is generally used, larger quantities causing the reaction to become uncontrollable.

Considerable care is necessary in heating the monomer and catalyst during the early stages of polymerisation as the reaction is exothermic. Unless the initial temperature is kept below 65-66° C. there is a danger of low molecular weight compounds being formed. During the resin-forming there is a volume contraction of about 13 per cent; castings during curing will shrink about 18 per cent, but the use of a prepolymer greatly reduces the volume shrinkage. During the transition from monomer to solid resin by additional polymerisation there is only a very slight loss in weight.

Reinforcements

In the low pressure laminating field diallyl phthalate can be used with a variety of reinforcements, principally glass cloth or fibre, paper and sisal, cotton and linen fabrics. It is possible to produce laminates of many different forms—flat and rigid sheets of great strength and durability, flexible laminates and laminates which may be postformed.

The process of lamination consists essentially of treating the sheets of reinforcing material with prepolymer or allyl syrup, laying up the sheets to build up the required thickness or shape and then subjecting them to heat and low or contact

(*continued on page 228*)

MODIFIED ANALYTICAL INSTRUMENTS

Microchemists' Informal Display in London

INNOVATIONS and improvisations of considerable originality and utility to analytical chemists were presented after the annual general meeting at the Sir John Cass College on January 27 of the Microchemistry Group of the Society of Public Analysts and Other Analytical Chemists. Good technical descriptions were given in papers presented by members.

A split-type micro combustion furnace, suitable for use in micro-Dumas nitrogen determinations, and determinations of sulphur and halogens, was exhibited and described by Mr. G. Ingram. The furnace, probably the first of its type in this country, is designed for easy replacement of the elements if these burn out, and can be produced quite cheaply.

Mr. Ingram also exhibited a micro-stirrer and a micro-burette. The stirrer is driven by a toy motor, and is fitted on a stand with an adjustable platform. This platform can be used to raise and lower the vessel to be stirred, and has an attachment for test-tubes.

The burette, controlled by a micrometer screw, has mainly been used for determinations of small amounts of iodine, though it is also satisfactory for any ordinary micro-titrations, such as acid-alkali titrations.

Dr. W. T. Chambers showed and described a pressure regulator, and a combustion train for determinations of sulphur and halogens. It was shown in the course of demonstrations that the pressure-regulator maintained a very even rate of passage of gas, and it had the additional advantage that the gas is not bubbled through a liquid at any stage.

Determination of Sulphur

The combustion train, similar in general lay-out to that described by Hallett, contains a number of modifications, notably a less complicated absorber. Efficient mixing of gases in the combustion tube is ensured by passing them through a sintered quartz disc. This disc also provides a safeguard against too rapid vaporisation of the sample. That can be recognised by the behaviour of the pressure indicator, and suitable action can be taken at once.

Mr. F. J. McMurray described a semi-automatic combustion furnace. The short burner is moved independently by a motor, and as exhibited, the furnace, whose electric heaters are thermostatically controlled, is suitable for the estimation of nitrogen, sulphur and halogens. With minor adjustments it can also be applied to carbon-hydrogen determinations.

The movement of the short burner can be controlled so as to make a complete travel of 5½ in. in from 12 to 25 minutes. Times outside this range can be obtained by adjustment. With this furnace it is said to be easy to carry out ten nitrogen determinations per day, and also to carry on other work. Once the movement of the short burner is started it needs no attention.

Photo-Electric Nephelometer

Mr. A. C. Mason demonstrated a photo-electric nephelometer made largely from ordinary laboratory apparatus. It had been developed for investigation of the nephelometric determination of potassium by cobaltinitrite. Although this method was ultimately abandoned, the nephelometer continued in use, and was suitable for a wide range of turbidities, as was shown by Dr. A. J. Lindsey. Where separations are being carried out, disturbances of the electrodes must be avoided. The use of an ordinary water-bath for heating purposes, with subsequent replacement by a cooling vessel, are complicated by this requirement. The split block may be readily removed, in two sections, and placed on a special stand, its place on the electrolysis stand being taken by another cold block of the same pattern.

Mr. M. A. Fill described rotary stirrers and a simple micro-burette. The stirrers, which may be used in conjunction with a platinum wire stirrer or a magnetically operated mechanism, are constructed on an air-turbine principle. The outer casing, made of two plastic bottle caps, contains a rotor easily constructed from an ordinary cork, and this may either be connected to a platinum stirrer, or may carry a small but powerful magnet. With smaller models of the stirrer, as many as 2000 revs. per minute may be achieved. The micro-burette, made from a graduated pipette, is controlled by a tiny air-leak, which in its turn is ingeniously adjusted by a screw-clip. Mr. Fill also presented for inspection a variety of micro-stands and clamps made from plastic caps and glass rod.

Mr. P. Heath described modifications of

the Lidstone-Wilson micro hydrogen sulphide generator. An internal scrubber ensures complete removal of acid-spray contaminated with iron, while the rate of delivery is controlled by a bubbler rigidly attached to the outer jacket. The construction of the table carrying the iron sulphide is simplified, while the gas is delivered through a capillary inserted in a rubber diaphragm, rather than through quill tubing drawn out to a capillary. In this way considerable wastage of glass tubing is avoided. Mr. Heath also described the application of such a generator to the pressure method of precipitation as well as to the bubbling method.

Apparatus for conductometric microtitrations, robust and particularly suited to demonstration and teaching, was described by Dr. J. T. Stock. The electrodes are constructed from platinum wire rather than from platinum sheet, and several methods of simple and rigid construction are possible.

Because of the very small area of the electrodes, leading to ready polarisation, the solutions titrated should not be too concentrated. Very slight polarisation, not sufficient to affect the results seriously, was shown when titrating N/100 HCl by N/10 NaOH, and no polarisation could be detected when these concentrations were reduced to one-tenth. The characteristics of the instrument prevent further dilution, but working within the range indicated, results are very satisfactory.

The titration vessel can be stirred by a toy electric motor carrying on its spindle a powerful magnet. This is fixed below the titration vessel, and rotates a tiny steel bar, sealed in glass, lying in the bottom of the vessel. Vigorous agitation is achieved at the bottom of the solution, where it is most necessary, but there is little disturbance at the surface of the liquid, and consequently little danger of splashing. Alternative stirring may be provided by a turbine-driven magnet.

At the annual general meeting of the group the following office-bearers were elected for 1950: Chairman, Mr. R. Belcher; vice-chairman, Dr. C. L. Wilson; hon. secretary, Mr. D. F. Phillips; hon. treasurer, Mr. G. Ingram; members of committee: Mr. A. E. Heron, Mr. R. F. Milton, Dr. J. Sandilands, Mr. C. E. Spooner, Mr. D. W. Wilson, Dr. G H. Wyatt.

PLASTICS USES OF DIALLYL PHTHALATE

(*continued from page 226*)

pressure to effect a cure. Curing cycles vary from 5-144 hours for monomer with 2-5 per cent catalyst or 30 minutes to 4 hours for 30 per cent prepolymer with catalyst. Recommended conditions require starting temperatures at 75-80° C. increased over a period of half an hour until a top temperature of 115-125° C. is reached. These figures are merely indicative of minimum and maximum temperatures; most fabricators have developed their own cycles for specific types of laminations.

Advantages of the allyl esters for low-pressure laminating may be summarised: (1) Quick curing at low temperatures and contact pressure; (2) Good initial tack and adhesion to glass fibres and other reinforcing materials; (3) Ease of forming large shapes; (4) Formation of transparent, dimensionally stable resins that are non-toxic; (5) Formation of thermo-setting resins that possess good surface hardness and are non-inflammable; (6) Good electrical properties of polymer; (7) Excellent mechanical strength of allyl resins; (8) Ability to modify the resins by copolymerising, *i.e.*, using mixtures of monomers.

Sheets, rods and tubes can be formed by casting allyl resins in glass, metal, rubber, wood, plaster or wax moulds. Success in casting depends on several factors, notably the use of a prepolymer with catalyst; lubrication of the mould with suitable lubricant (*e.g.*, silicone fluid); careful control of temperature up to gelation and gradual increase until cure is effected; completion of cure at an elevated temperature (230° to 250° F.).

The cast allyl resins possess good surface hardness, excellent optical properties and resistance to chemical attack, crazing and distortion under heat.

For low temperature flexibility and low water extraction the inhibited monomer is suitable for a wide range of plastics, including alkyd resins, cellulose acetate, cellulose acetobutyrate, cellulose acetropionate, cellulose nitrate, ethyl cellulose, polyvinyl acetate, polyvinyl butyral and polyvinyl chloride.

Because of its high volatility, diallyl phthalate is not suitable for imparting permanent flexibility. Probably its most important plasticiser application is as a thermo-setting plasticiser for resins requiring non-migrating additives. For this particular purpose the monomer is, of course, not inhibited.

PRESENT TRENDS IN BAKING RESEARCH

Effects of Silicones, Mineral Oil, and Anti-Staling Agents

by JOHN B. M. COPPOCK, B.Sc., Ph.D., F.R.I.C.

THE food industry is at present faced with an ever-increasing number of new chemical materials possessing a wide variety of potential uses. Emulsification agents, for example, might be used for extending fats, anti-oxidants might be used for preventing rancidity development, both inorganic and organic chemicals might be suggested as improvers of the baking quality of flour, or again find use as foaming agents or as agents in the improvement of hygiene in the form of detergents, insecticides, etc.

Each of these substances may possess potentially toxic characteristics and it is of the utmost importance that there should be complete physiological data regarding any new substance which might find its way into edible products, so that suitable limits may be prescribed for its use.

There are three main types of materials about which detailed physiological data and, in many cases, nutritional data will be required before the baking industry can feel adequately safeguarded regarding their utilisation. They are:—

(1) Those which are included as ingredients, whether as fat extenders, or extenders of other materials, flavouring agents, aids to better distribution of ingredients, anti-oxidants, or as preservatives.

(2) Those materials used in baking operations which might be absorbed by doughs or batters during processing.

(3) Those materials distributed in a bakery for hygienic purppse, which might be absorbed by doughs or batters.

Absorption Conditions

Detailed information regarding absorption, metabolism and toxicity are necessary in the case of those compounds listed under (1). In the cases of the compounds (2) and (3) the first problem is to determine the extent to which they are absorbed by the food product under conditions specified for their use, or alternatively to determine conditions under which absorption does not occur, or occurs to a negligible extent; this latter problem is tied up with determinations of the levels at which toxicity becomes manifest.

Silicones have been used in America and on a restricted scale in this country for producing water repellent glazes on baking tins, so obviating the use of tin greases. When dissolved in a solvent, these silicone solutions can be painted, sprayed, or otherwise distributed on a baking tin, and, after drying to remove the solvent, are cured by baking at the usual temperature. This curing produces a thin, durable glaze which can stand repeated use approximately 200 times without renewal of the coating.

Silicone Tests

Careful investigation of the possibility of absorption of the resin by bread baked in tins coated with these resins has indicated that no absorption of silicone by the bread crust occurs. From considerations of the loss in weight of a normal silicone film during a series of baking experiments, the maximum amount of silicones that could be taken up by a loaf was 0.00005 per cent. It is not considered that this amount is of physiological importance.

The DDT smoke-fumigation method of destroying insect life in bakeries has attracted much attention. In the U.S.A. the Federal Food and Drug Administration will not permit any residual DDT in foodstuffs. In Britain no authoritative statement has yet been made as to the quantity which might be permitted as a residue in baked goods.

The toxicology of DDT has been examined exhaustively and it would appear that in extremely small quantities there may be little harmful results from its use, although its chronic toxic effects are not yet fully understood and very careful control may be necessary.

This control must extend beyond the bakery. DDT is used as a fumigant in flour mills, and the Ministry of Agriculture has no objection to its use, provided the flour does not contain more than 7 p.p.m. of DDT. Recommendations have been issued to the baking industry that no baked product should contain DDT in excess of this figure.

The mode of distribution of mineral oils in doughs has been studied at great length. The degree of retention of the oil varies considerably with different recipes.

* Summary of lecture given before the London and South Eastern Count'es Section of the Royal Institute of Chemistry

Earlier work indicated that mineral oil strongly adheres to the grain structure of bread, even after enzyme degradation. A starch bread containing no gluten will retain much of the oil on attempted extraction, and addition of gluten to a normal wheaten dough renders the mineral oil even more difficult to extract.

Microscopic examination of bread doughs indicates that, when mineral oil is slightly absorbed, as it would be from a tin grease, it is readily dispersed as a continuous film throughout the dough.

Physiological Damage

The new Mineral Oils in Foods Order gives a tolerance of 0.2 per cent of mineral oil present in baked goods, consequent on mechanical lubrication. At this level the particles which Frazer has shown might cause potential damage to the liver of 0.5μ or less are absent, and the dispersion of the oil is in a form of a continuous film, which even after enzymic digestion does not appear to break up. The likelihood of physiological damage to the consumer is remote.

Polyoxyethylene stearate was first described by Favor and Johnston as a crumb-softening agent for bread and already has found very extensive use in America. There it is used at levels of approximately 1 per cent of the flour weight. The commercial material contains from 4-13 oxyethylene groups, and 0.3 per cent ethylene glycol is often present as an impurity.

In British breads a crumb-softening effect is obtained with polyoxyethylene stearate (POES) at a 0.2 per cent level. In experiments, loaves containing POES showed a greater volume and a higher average weight than the controls.

Using a "firmness test," it was found that the firmness of unwrapped breads containing no POES increased rapidly with time, while those containing POES showed only a slight increase. Even where the moisture losses of the control and the POES-containing loaf were identical, the POES-containing bread was the less firm.

From these experiments it would appear that this material might greatly improve the keeping quality of bread. Physiological data in America and elsewhere have generally been favourable, but recent experiments have led to some uncertainty regarding the use of this material in human nutrition.

So long as there is any doubt of this type, such materials should not find their way into edible products such as bread, however attractive they may be.

The foregoing illustrates probably better than any other example the urgent need for exhaustive physiological examination of materials of this type prior to their incorporation in food. It is an indication of the work that lies before the food scientist. It is an undeveloped avenue in research in both bakery and food science, and one which holds opportunities for those prepared to follow it to the end.

Several speakers in the discussion which followed the presentation of the paper confirmed the belief that there is need of much more stringent tests of materials incorporated intentionally or otherwise in foodstuffs. Mr. A. L. Bacharach stressed the importance of prolonged and detailed tests of chronic toxicity by the pharmacologist (rather than the physiologist).

Mr. E. B. Bennion urged the need for haste in completing such experiments on such things as polyoxyethylene stearate, recalling that it had taken the Ministry of Food six years to put a stop to the use of mineral oils as food ingredients. There was always the risk of the appearance of new products with high-sounding names having perhaps as their active principle one of the materials about which little is known.

Toxicity Problems

Mr. Hymas asked if we were not being over cautious in regard to the use of DDT, in view of the number of clinical trials that had demonstrated its non-toxicity.

Dr. Coppock said that his recent visit to the U.S.A. had brought him in touch with some very recent work on the chronic and acute toxicities of DDT, which indicated that it was considerably more toxic than had hitherto been supposed. To the further question by Mr. Hymas as to the use of alcohol instead of acetone for the extraction of DDT Dr. Coppock said that in his laboratory alcohol had been found more suitable than acetone.

Retarding Dough Formentation

SCOTTISH food chemists have been showing considerable interest in practical work now being done on retardation of fermentation in dough. The process received a somewhat hesitant reception in England but installations in Motherwell and Stirling, where excellent results have been achieved, have created interest in Scotland.

An essential feature of the process is that dough can be prepared to a given point and retained in cold storage for use the next morning or later. Fermentation experts are now studying the performance of yeast under the new process.

Difficult Moisture Determinations

Comparisons of Methods and Equipment

MODERN methods of moisture determination were the subject of several papers and discussion at a meeting in London last week of the Physical Methods Group of the Society of Public Analysts and Other Analytical Chemists, with the president, Mr. George Taylor, in the chair.

Developments in the use of the Karl Fischer reagent were dealt with in the opening paper by A. G. Jones. Methods for determining the end-point of titration were explained. Finally, referring to the versatility of the Fischer method, the speaker commented on the determination of water hydration of inorganic compounds, the reaction of these compounds themselves with the reagent and the determination of organic functional groups through organic reactions in which water is liberated or consumed.

A radio frequency moisture meter for routine control, based on the change of the permittivity or dielectric constant of the sample material with variation of moisture content, was described by A. T. S. Babb.

Mr. R. W. Money followed with a discussion on the necessity for determining moisture contents of the order of 0.1 per cent in granulated sugars.

The reference methods (AOAC) were too time-consuming for the routine control purposes required, while in the straightforward vacuum-oven methods the experimental errors were too large.

Preparation of reference samples presented difficulty owing to rapid changes in moisture content and to overcome this difficulty a method was developed of conditioning small samples in atmospheres of high relative humidity.

The Karl Fischer method and apparatus were modified and gave good results, but the frequent standardisations involved were only justified if the apparatus was in continuous use and the operation required a high standard of technique. An air-flow method was therefore developed.

Finally, the determination of moisture in tobacco was the subject of a paper by Mr. G. F. M. Fryd, who said that an attempt had been made in the Government Laboratory to find an explanation for the not inconsiderable component of this apparent moisture which does not exist as H_2O in the undried tobacco, but is produced either by reactions of the Maillard type or by other reactions involving reducing sugars.

Italy Studying Native Activated Alumina

RESULTS of tests with Italian activated alumina, leading to the recommendation that the Italian chemical industry may well use the home-produced article in preference to the silica gel at present imported, are reported by G. Di Giulio, of the research department of Indust. Naz. Aluminio, Porto Marghera, in *La Chim. et l'Ind.*, 1949, *31* (10), 360-362. These results confirm and supplement those already made known in published literature. Particular reference is made to the work of Thibon *et al.* (*La Chim. et l'Ind.*, 1947, *57*, 117).

Four samples of varying fineness were prepared, of the Bayer aluminium hydrate type: (a) 10-60 micron, (b) 1-2 mm., (c) 3-5 mm., and (d) 9-10 mm., with combined water 34.51, 33.65, 32.60 and 32.30 per cent respectively (theoretical 34.62). The loss on roasting at 1200°C. was about 9.5 per cent. Re-absorption of water by the four samples was then found to be 20.85, 19.5, 19.5, and 8.2 per cent respectively. At this stage the sample (d) was eliminated as practically useless.

Both static and dynamic absorption tests were then made, the latter with samples (b) and (c) with air velocities ranging from 25 to 100 lit./hr. Total water absorption with both samples ranged from 15.4 per cent at 100 lit./hr. velocity to 18.9 per cent at 25 lit./hr.

In the static tests, the water absorbed as percentage of alumina after 5 hours' exposure was (a) 2.4, (b) 2.7, (c) 2.95; after 8 hours, 20.7, 19.3, 19.2 per cent. Reactivation tests gave about the same relative results for the three samples, *i.e.* (a) was slightly more than (b) and (c).

Indian Plastic Clay

Plastic clay of a high grade has been located in the Tumkur district of Mysore, India. The deposits, estimated at more than 5000 tons, are said to be comparable with Czechoslovakian clay.

Increasing the Hardness of Diamonds

Possible Application of Atomic Energy

AN interesting possible application of atomic energy is that of changing the colour and other properties of gems, especially diamonds. In the case of diamonds it is suggested that hardness also may be increased, thus making the lower quality stones more suitable for industrial uses. These possibilities are claimed in a recent patent, open to public inspection, No. 13986/1949, in the name of N. E. Nahmias (Conv. date 31.5.48).

The method consists of the use of neutrons to produce permanent colour change by altering the "pigmentation" factors in the nuclear structure, thus modifying physical and chemical properties, *i.e.*, transmutations *in situ*. Neutrons must be so selected that they have no adverse effect on the main structure of the gem, such as carbon in the diamond, which might be converted into boron under energies of about 20 MeV.

Reactions of Impurities

The nuclear reactions of impurities and colouring matter must be such that there is no risk of return to the initial element, *e.g.*, through the beta radioactive element, as exemplified in the case of Al^{27}. Other necessary conditions are stipulated as to the amount of neutrons per sq. cm./sec. and their appropriate action.

The number and percentage of impurities in gems are very variable, and it is therefore impossible to predict all the nuclear reactions during and after neutron bombardment. Experiments with gems of which the chemical composition is accurately known—to the standard required in nuclear research—will enable irradiation effects to be classified. Chemical analysis of impurities will be facilitated by study of half-lives and other manifestations. Better knowledge of impurities will also facilitate the study of variable physical properties of diamonds, *e.g.*, significance of variations in Ångstrom readings, nature of Laue spectrograms, hardness, etc.

It is not unlikely that some impurities act as catalysts in the transformation of graphite to diamond, with considerable shortening of the time factor (Bridgman, *Jnl. Chem. Phys.*, 1947, *15*, 52). In order to evaluate the number of neutrons per sq. cm./sec. required to modify appreciably the amount or nature of impurities and therefore colour, 1 g. of diamond is taken by way of example. This contains 5.10^{22} atoms of carbon and 5.10^{18} atoms of impurities of mean atomic weight 50. (This diamond appears to have been exceptionally impure.)

It is known that 10,000 neutrons at least are necessary to touch one nucleus, so that 5.10^{22} neutrons are needed to transform all these impurities. Efficiency will vary directly with multiple diffusion and inversely with neutron absorption by residual nuclei. If it be assumed that these effects cancel out, a source of more than 10^{21} neutrons is needed to bombard this diamond, the total surface of which is assumed to be about 1 sq. cm.

Calculations show that an atomic pile of 1 million kW. gives a flux of 10^{21} neutrons per sq. cm./year. It is fortunate that the presence of a large quantity of diamonds in the pile will not disturb its behaviour because, generally, such atomic piles use carbon as a neutron slowing medium.

It is not, however, necessary to wait a year for colour changes, for colour is due to a combination of factors, including impurities. It is claimed that after a few weeks' irradiation the initial percentage of impurities will have changed and new pigments been formed. Gamma, beta, and x radiations are also present in the pile, and will be produced in irradiated diamonds. These, too, will modify colour. It is therefore necessary to get rid of this transitory colour change by heating the diamonds to a sufficiently high temperature or exposing them to sun- or ultra-violet rays. It is also necessary to wait until all radioactive elements formed *in situ* have dispersed.

Future Applications

Such radioactive treatment will be followed by standard methods: Geiger counters, photographic plate, or self-counting crystal. Only in this way can permanent colours be obtained.

It is claimed that by neutron radiation it is possible to determine the nature of the impurity which renders stones unfit for industrial use, and make better selection of gems for such uses.

The use of diamonds, natural or synthetic, or of purified transformed graphite, as a slowing medium for neutrons in the pile, may be another application of this invention. Piles less than the 1 million kW capacity would serve.

The Chemist's Bookshelf

AN INTRODUCTION TO MOLECULAR SPECTRA. R. C. Johnson. Methuen & Co., Ltd. Pp. xiii + 296. Plates VIII. Figs. 151. 40s.

In the preface to this book the author states that he has " attempted to provide a text-book for the student who has graduated in physics or chemistry, or who is approaching graduation, and desires an understanding of the subject within the limits of ordinary mathematical equipment at that stage. Thus, at one or two points I have introduced the results of wave-mechanics, but I have not assumed familiarity in the use of this method." It is of interest to examine, from the point of view of the chemist, how far this has been achieved, and, how far the implied assumptions are justified. First, it is doubtful if the book would attract the student about to graduate in chemistry, or would, indeed, be worth the necessary effort to master the subject at that stage, unless he were a student who felt strongly that he had a vocation for this field, and that he must, even at that crowded stage, attain to a full knowledge of the historical development and classical physical background of the subject. Even for the graduate it is probable that there is too much detail, except for the specialist—who may well have a closer acquaintance with wave mechanics than the author assumes. The reviewer cannot speak for the physicist at the same level.

Without the preliminary of an introduction to atomic physics, for which the reader is referred to another monograph by the author, a brief description of the phenomena observed in band spectra leads to a full discussion of the subject. Where questions of valency arise the reader is again referred elsewhere, only a very sketchy treatment of molecular levels and the general problems of valency being given. Following this (the first third of the book) the next section is concerned with fine structure and related phenomena. The final third devotes one chapter to the spectra of polyatomic molecules, one to the Raman effect, and one to various applications of molecular spectroscopy. For the chemist these three chapters are probably of most interest. But it is noteworthy that the applications to chemistry which are chosen as representative are dealt with in six pages, and are concerned solely with absorption in the visible and ultra-violet. Biochemical applications are also accorded six pages.

The majority of the 300 references are to the early work in journals and monographs, only 30 referring to the period after 1940 (of which 17 occur in the 10-page section on applications to astrophysics) and a further 45 to the period 1936-1940. It is not clear why, in a book published in 1949, the preface should be dated 1945. This, coupled with the lack of recent references and of the knowledge of the strides, of interest to the chemist, that have been made in this field in recent years, does not give the reader confidence in the up-to-dateness of the information, although the classical treatment is sound.

The general lay-out and typography of the book are, unfortunately, not attractive. The pages have a crowded appearance and in many cases the diagrams, which in themselves are excellent, give the impression that they are inextricably mixed up with the text.—C.L.W.

INTRODUCTION TO CHEMICAL ENGINEERING THERMODYNAMICS. J. M. Smith. London. McGraw Hill. Pp. X + 386. 34s.

The fact that thermodynamics is not merely a sport of experts in applied mathematics but a useful working tool for chemists and chemical engineers is becoming more widely appreciated. While the chemist uses these laws in studying chemical equilibrium and thermal effects, the chemical engineer also finds them useful in several processes of transfer of energy. This is why a new work on the subject, directed specifically to chemical engineers, merits careful consideration. One's major impression of the present work is, in fact, favourable.

A genuine attempt has been made to develop the subject by discussion of the physical realities with a minimum of mathematics. It has previously been pointed out (THE CHEMICAL AGE, 61, 829)

that the subject is best taught by giving applications which clearly indicate its usefulness, thus fixing the methods and conclusion in the mind of the student. This approach is consistently followed here.

An English reviewer, however, has one or two reservations. In a field in which large numbers of symbols are used and formulæ remembered by symbols, complete consistency is essential. One notes with regret, therefore, that there are some discrepancies between the list of symbols used in this work—which are very clearly tabulated—and those recommended in B.S. 813. Thus, for instance, π is given as the British recommendation for pressure, but this volume uses ρ. To define a "standard state," B.S. 873 uses 0 as a right-hand superscript, while J. M. Smith uses 01. For the Gibbs Free Energy ($=H-TS$), one uses in Britain the symbol G, and J. M. Smith uses F, which is recommended in the British Standard as the symbol for the Helmholtz Free Energy ($=U-TS$). These differences, resulting in equations which will look different, are liable to confuse students.

A further defect from the standpoint of the self-student is that no answers are given to the excellent sets of problems which conclude each chapter. This limits the usefulness of the book for a category of reader probably far outnumbering those likely to use it at a teaching institution. With these reservations, however, it seems a very useful book for undergraduates in their later years working with a good teacher.

CRUCIBLES: THE STORY OF CHEMISTRY. Bernard Jaffe. Third edition, 1950. Hutchinson's Scientific and Technical Publications. Pp. 480.

The demand for popular presentation of the fundamentals keeps pace, at least, with the multiplication of the arresting recent results of scientific research. Bernard Jaffe's present considerably enlarged edition of the book for which he was awarded the Francis Bacon Award for the Humanising of Knowledge (£1500) in 1930, serves that need on an ample scale and is well designed to give the non-scientist a colourful yet factual account of historical episodes in the development of chemistry from the long dark gropings of the alchemists to some of the contemporary applications of the products of nuclear fission. Characteristic of the chapters of the original work and the four new chapters summarising the approach to nuclear fission and its results is the skill with which are presented the personalities of the men who led the way into these new fields of knowledge. It is essentially a "human" book, well adapted to stimulate in the casual observer of scientific affairs a better understanding of the methods (and the tribulations) by which surprising discoveries of the present time were reached. It makes clear, as some writings on the subject do not, how great a debt chemists owe to the alchemists for their laborious production of the basic equipment of all chemical laboratories. Written by an American, for American readers in the first instance, the book's account of the steps leading to the disintegration of the atom and subsequent events tends to give an unbalanced picture, in which the work in countries other than the U.S.A. gets rather scant acknowledgment.

METALLOGRAPHY DES MAGNESIUMS und seiner technischen Legierungen (Metallography of Magnesium and its Technical Alloys). 2nd edition. W. Bulian and E. Fahrenhorst. 1949. Berlin/Gottingen-Heidelberg: Springer-Verlay. Pp. 140, with 250 illustrations.

This second (1949/edition), dealing with the metallography of magnesium and its technical alloys, is one of a series of monographs on pure and applied metallography published by Springer-Verlag, of Berlin and Heidelberg. The authors are Walter Bulian and Eberhard Fahrenhorst, the former being director of the metallurgical laboratories of Wintershall AG. Both are former contributors to the literature of magnesium. The new and enlarged edition, with author and subject index, presents 250 illustrations, including many microphotographs of $\times 1000$ or more (electron microscope).

The most important sections of the monograph, those dealing with alloys, are limited almost entirely to the Mn-Mg and Mg-Al-Zn groups, which, industrially, are, of course, so far the most valuable. The first group, containing 1.4-2.0 per cent Mn, is particularly useful because of its easy workability, resistance to corrosion, and ready weldability. The 1.8 per cent Mn type, however, has certain defects in the cast state, such as coarse granulation and its attendant disadvantages. Only passing reference is made to numerous attempts to remedy this by addition of Ca and Zr. The addition of Hg appears to be of little practical interest at the moment. The Al-Zn-Mg group is fully dealt with, including some of the most recent research.

FRENCH LEATHER RESEARCH

Cultivation of Colonial Tannins

A WIDE range of studies on leather tanning materials and processes is described in the report for 1949 of the Research Institution of the French Leather Industry, at Lyons.

Some interesting work has been done in connection with the use of tanning extracts for the disincrustation of boilers. Among the conclusions arrived at was that oak bark extracts produced the same favourable results as did horse chestnut extracts, but that sulphite cellulose extracts were not effective.

Mineral tannages were studied intensively during the year, with particular attention to the influence of organic salts on chrome alum and sulphur of alumina solutions. Certain conclusions of this study, which forms the basis of a thesis by Monsieur Grall, tannery chemist and engineer, are likely to lead to interesting practical applications, and the necessary steps have been taken to implement this.

The research work on vegetable tanning products, with a view to their cultivation and use in the French Union, has made little headway in the year, mainly because of the difficulty of finding the necessary materials. This may, in part, shortly be solved by the supply of a tanning product extracted from the bark of an Australian eucalyptus which is now cultivated in Morocco and to some extent in south-western France, in the Landes region. The tree is the *Sideroxylon Eucalyptus*, and the tannin from the bark seems to be of very good quality. This research is proceeding satisfactorily.

The material available for laboratory tests in regard to chamois tanning is not sufficient for practical research and scientists were only able to carry out laboratory work on the oxidisability of oils.

Copper Pipe Failures

THE British Non-Ferrous Metals Research Association has published its findings, based on several years' research, on the behaviour of copper in supply waters.

Experiments indicated that carbonaceous films were responsible for at least three-quarters of the cold water pipe failures examined. Some of the remaining failures are believed to be caused by a type of oxide scale formed in tubes during manufacture. These conditions both lead to pitting in uninhibited waters.

MEXICAN STATE DRUGS

Merger of German Interests

THE Mexican government is planning to create a federally-operated pharmaceutical products company, built around the property and rights of a group of formerly German-owned drug houses. These include Casa Bayer, the Behring Experimental Therapeutic Institute, Merck Mexico (the Mexican subsidiary of E. Merck, Darmstadt, Germany), Schering Mexican Chemical, Beick Felix & Co., Carlos Stein & Co., Codex Laboratories, Gran Drugueria del Refugio and Stein Drugery.

The Mexican State industry will use the factories, land and equipment and the trade names, patents and markings of the following firms: I. G. Farbenindustrie, Chemische Fabrick Auf Actien, Schering Kahlbaun, Asta Aktiengesellschaft Chemische Fabrick, Knoll, E. Merck, P. Beiersdorf & Co., Chemische Fabrick Pilot, E. Tasechner, Chemische Fabrick Promohts, Ichtiol Gellschaft, Cordes Hermanni, Desitin-Merk Carlo Clinke, Liguer Werke, and Chemische Fabrick Helfenberg.

Tests with Radioactive Insecticides

THE successful results obtained by Pestox 3, the recently developed systemic insecticide, offering marked effectiveness in preventing virus diseases transmitted by aphids, were called to mind by Sir Guy Marshall, chairman of Pest Control, Ltd., at the company's first annual general meeting.

The chemical research laboratory had synthesised a number of new chemicals for biological testing, said the chairman, and for test purposes had produced radioactive isotopes of the chemicals, believed to be the first radioactive systemic insecticides made in the world.

The New Flour "Improver"

A STATEMENT recently issued by the Ministry of Health and the Ministry of Food suggested that the supplies of the new flour improver (chlorine dioxide), recommended to replace agene, and the plant to make it may have to be secured from the U.S.A.

This, according to one of the principal suppliers of agene in Britain, does not reflect the true position. The facilities exist here to produce chlorine dioxide in the requisite grade and quantity, if manufacturers are given adequate notice.

· PERSONAL ·

APPOINTMENTS of 13 full-time professors at the North Staffordshire University College, to be opened at Keele, near Newcastle-under-Lyme, in August, were announced last week. MR. H. D. SPRINGALL, senior lecturer in chemistry, Manchester University, will be professor of chemistry, and MR. F. A. VICK senior lecturer of physics at the same university will be professor of physics.

MR. C. W. ROBINSON has tendered his resignation as secretary of the Association of British Pharmaceutical Industry and has accepted an appointment in the industry. He was appointed secretary of the association (then the Wholesale Drug Trade Association) at the end of 1945 in succession to Mr. Arthur Mortimer. During the four years of his secretaryship a considerable reorganisation of the association's activities has been carried through, culminating in the successful merger with the Pharmaceutical Export Group at the end of 1949. The date of Mr. Robinson's retirement and the identity of his successor are not yet known.

MR. C. E. J. SENDALL and MR. A. J. JONES are to retire from the board of Evans Medical Supplies, Ltd., and will relinquish their executive offices after the annual meeting of stockholders later this year. MR. C. W. ROBINSON (at present secretary of the Association of British Pharmaceutical Industry) is to join the board of the company later this year as full-time pharmaceutical development director.

MR. F. YEO-THOMAS who has been appointed the Federation of British Industries' new representative in Paris, has a distinguished record in two wars. During 1941-1944, he was parachuted into France three times and, in 1944, was arrested by the Gestapo, escaped from Buchenwald and returned to England. He was awarded the George Cross and M.C. and Bar, the Legion of Honour and the Croix de Guerre with four Palms.

The appointment of MR. GODFREY CLAXTON and MR. R. A. FRASER as chief chemist and assistant chief chemist, respectively, has been announced by the National Benzole Co., Ltd. Mr. Claxton became the company's research chemist in 1935.

SIR FREDERICK BAIN, deputy chairman of I.C.I., sailed on the *Queen Mary* this week to tour the company's interests in North America, including its largest overseas subsidiary, Canadian Industries, Ltd. He will be guest speaker at the annual dinner in New York of the American Society of Chemical Industry on February 17.

MR. V. A. LOWINGER, C.B.E., has retired from the chairmanship of the International Tin Research and Development Council, which controls the Tin Research Institute. His successor is MR. G. F. A. BURGESS, a joint managing director of the British Metal Corporation, Ltd.

MR. CHARLES JAMES WRIGHT, of Paisley, technical adviser to J. & P. Coats, Ltd., has been elected a Fellow of the Textile Institute. Mr. Wright has made substantial contributions to original work in colour dyeing, and has been responsible for special research investigations into detergent treatments and their relation to fastness, and the exhaustion and diffusion of vat dyestuffs from alkali-hydrosulphite dyebaths.

DR. FRANKLIN T. PETERS has been assigned to the newly formed development department of Glyco Products Co., Brooklyn, N.Y. The doctor, who has been with the company since 1947, was formerly with E. I. Du Pont de Nemours & Co. in a research capacity.

MR. ARTHUR PERRINS BEVAN, of Liverpool, a past president of the National Paint Federation, left £10,898 gross, with net personalty £10,582.

MR. HERBERT EDWIN JONES, of Hartford, near Northwich, industrial chemist, left £23,264 gross, with net personalty £22,915.

Scientific Essay Awards

Prizes to the value of 85 guineas are to be awarded by Imperial Chemical Industries, Ltd., publishers of *Endeavour*, for essays on a scientific subject. The primary purpose is to stimulate younger scientific workers (under 26) to take an interest in the work of the British Association and to raise the standard of scientific writing.

COMPARATIVE PROGRESS IN GERMANY

Substantial Advances in East and West

THE Economic Plan for the Soviet zone of Germany envisages an increase in chemical production by 20 per cent for 1950. Greatly enlarged production quotas have been imposed by the Ministry of Planning on the heavy inorganic chemicals factories, especially on the sulphuric acid plants. These raised their output from 155,000 metric tons (SO_3) in 1948 to 180,000 tons last year, thus removing one of the most serious bottlenecks in the Soviet zone economy. Production is expected to reach 250,000 tons in 1950, provided the projected plant replacements and extensions can be carried out in time.

The potash industry, concentrated in 17 mines with 137 shafts in Thuringia and Saxony-Anhalt, is to increase its output by 15 per cent this year. A new potash mine is to be opened, and technical improvements and extensions are to be effected in those already operating, in order to provide larger supplies for foreign customers, among whom Poland, Czechoslovakia and the Scandinavian countries are now most important.

The nitrogen production target has also been raised with a view to procuring larger supplies for export. The Leuna plant, still the leading producer in the Soviet zone, is to produce 150,000 metric tons (N) this year. Larger exports of nitrogenous fertilisers are to pay for increased imports of crude phosphates, especially apatite from the Kola peninsular.

In the 1948/49 agricultural year Soviet zone fertiliser consumption was reported as including 174,000 tons N, 60,000 tons P_2O_5 and 235,000 tons K_2O. For the current year farmers are promised larger supplies of all three fertiliser components; in this way it is hoped to regain pre-war yields in agriculture.

More Oils

Much attention is being paid to extension of the production of fats, oils, soaps, etc. Distillation of crude fats has been resumed at the works of Deutsche Hydrierwerke at Rodlingen, where the paraffin oxidation plant is to be restored. A new wood distillation plant has been erected at Mellensee. The production of mineral colours is to be undertaken at Fürstenwalde. The manufacture of catalysts for hydrogenation works started at Leuna before the end of last year.

Among other new products is an anti-corrosion lacquer made from artificial resin. Many of the novelties introduced serve to overcome shortages of import commodities. More attention is to be paid this year to co-ordination of publicly-owned and private factories, with a view to cost economies.

West German Progress

In western Germany the recovery noted in the autumn months has continued into the new year and the surplus stocks accumulated last summer have been mostly disposed of. In some sectors of the chemical industry, however, output at the end of 1949 was still below the 1948 peak, notably in the plastics trade, which is now reported to be meeting all domestic demands. Production of phenol is still not quite adequate, but the methanol output has risen substantially and will leave a surplus available for export.

Continued expansion of domestic production will permit substantial cuts in imports. A temporary import ban has been imposed on a number of commodities of which adequate stocks are said to be available, including aluminium, copper, zinc, antimony, tin, lime arsenate, arsenic, glycerine vegetable oils, lubricants, lacquers, varnishes and talcum for use in insecticides. Imports of nitrogenous fertilisers and superphosphates are to cease this year.

The liberalisation of inter-European trade is likely to result in an increase in imports of semi-finished and finished products, but German chemical manufacturers hope to derive more benefit in foreign countries from such a move than foreign suppliers in the German market. Trade with Japan is to be resumed under a recently concluded trade agreement; the principal German export item of chemical interest will be potash.

Following the closing of the two Fisher-Tropsche plants at Castrop-Rauxel and Wanne-Eickel on January 1, Ruhrchemie AG has discontinued the production of catalysts for the synthetic oil plants at the Oberhausen-Holten works; plans have been drawn up for the starting of alternative production schemes in the catalyst factory. Orders have been issued by the U.S. authorities for the dismantling of the magnesium works of Wintershall AG at Heringen, Hesse, which have been idle for some considerable time.

D

Germany's leading rayon producer, Vereinigte Glanztoff-Fabriken AG, has now published its accounts for the first three post-war years and shows an increased turnover during the past two years. The company has drawn up a long-term maintenance and investment programme which it has already begun to put into effect. Its main items are modernisation of the rayon plant at Oberbruch and erection of a commercial-scale nylon plant. This would seem to prove that the experimental work at the nylon pilot plant at Oberburg has progressed satisfactorily.

PETROLEUM RESOURCES

THE recent proposal of the economic authorities of the Federal German Republic to abolish the rationing of petrol as from February 1, and to reopen the German market to foreign oil companies, has come as a surprise both to German and to foreign observers. German output of crude oil last year—of 841,500 metric tons; about 32 per cent more than in 1948—covered only one-third of requirements. The balance has been imported through the "Government Army Relief in Occupied Area"; that is to say it has been a gift from abroad.

The winning of oil on a commercial basis is a relatively new branch of the German economy. At the beginning of the 'thirties, four small oilfields in the Hanover area yielded 200,000 metric tons, equivalent to about 5 per cent of requirements at that time. When the Nazi régime, as part of its preparations for war, provided subsidies for a systematic oil search, the number of wells completed and the total length drilled trebled within five years. Only 5 per cent of them proved to be producers and this ratio remains unchanged to-day.

The Emsland Fields

The second world war brought a powerful stimulus to the German oil industry and a total of one million metric tons—the highest figure recorded—was won in 1940. Most of it came from Hanover, Hildesheim and Celle and part of Schleswig-Holstein. Searching for natural gas, German geologists discovered the Emsland oilfields, situated in the vicinity of the frontier with Holland, the major importance of which was evidenced by the raising of 114,000 tons of oil in 1947. The following table, which gives output figures for the four main producing regions of Western Germany, shows that output in the Emsland doubled between 1948 and 1949.

	1949 (*metric tons*)	1948
Emsland	324,940	167,847
Hanover	412,646	370,086
Schleswig-Holstein	98,024	91,267
Baden	5,901	6,040
W. Germany, total	841,511	635,240

Recent investigations indicate that reserves in the Emsland oilfields are 15-20 million tons; combined reserves of all the other known oil-producing areas are thought to be only 3 million tons.

German oil experts hope to increase total output to 1.1 million tons in the current year and to 1.3 million tons in 1951. The share of the Emsland in this total should be 45 and 50 per cent.

Imports by the Federal German Republic in 1949 have required about 2 million tons, over one-half of which was of crude oil.

Metals and Coal in the West

WITH the exception of the aluminium and related metal industries, production from the non-ferrous mines and smelters in North Rhine-Westphalia is reported to be on the increase.

The coal industry is stated by the *Monthly Report of the Control Commission for Germany* (*British Element*) (4, No. 11) to be making good progress in Western Germany. The daily production of hard coal in North Rhine-Westphalia on two occasions last year exceeded 368,500 tons.

The programme of industrial explosives manufacture in the Land for November was 1670 tons, of which 866 tons was for the coal mining industry. The processing of pyrites cinders at Duisburger Kupferhütte has reached the pre-war maximum output of approximately one million tons a year.

It is reported that in 1949 over 200,000 tons of superphosphate were imported and plants in the Land have been unable to manufacture at more than some 60 per cent of capacity. The decision to cease imports is therefore welcomed by fertiliser producers.

Production of staple fibre for the textiles industry has reached a record figure of 3732 tons a month. The most notable increase has been in the output of rayon staple fibre, which advanced from 6590 tons in September to 7660 tons in October, 1949. West German synthetic fibres are dearer than the general European price level.

HOME

Chemists and Druggists

At the January examinations of the Pharmaceutical Society, 35 candidates qualified as chemists and druggists (22 men and 13 women).

Chemical Production Index

The provisional index of industrial production by the chemical and allied trades in October last was 131, 17 points higher than the monthly average for the three preceding months.

Search for Oil in the North-West

Latest methods of instrument prospecting are being used in a renewed search for oil in the North-west. A survey part of the D'Arcy Exploration Company, a subsidiary of the Anglo-Iranian Oil Company, began working last week along the shore between the Mersey and the Ribble.

£60,000 for Sugar Plant

Blake-Barclay & Co., the Greenock engineers, hope shortly to complete negotiations for a £60,000 contract for machinery for a new sugar refinery to be erected at Beirut, Syria. The company recently completed a £40,000 contract for this type of machinery for Hong Kong.

Iron, Steel and N-F Metals Exports

Iron and steel exports rose by 14 per cent in the fourth quarter of 1949, the volume for the year being 16 per cent above the 1948 average. The volume of non-ferrous metals exported in 1949 was 10 per cent above 1948, or 255 per cent of the 1938 volume. (*Board of Trade Journal, 158,* 236).

Glasgow Firm to Use U.S. Patent

Alley & McLellan, Ltd., compressor manufacturers, of Polmadie, Glasgow, are completing an arrangement with Dresser Industries of America and their subsidiary, Clarke Bros., of Olean, New York State, which will enable the Scottish firm to manufacture, under licence in Glasgow, the latters' special oilfield type of gas compressor. Very substantial orders for this plant are said to be available.

Lanarkshire Coal Project Uneconomic

The plan to create a coal-distillation industry in Lanarkshire has been vetoed by the Secretary of State for Scotland on the finding by the Scottish Council (Development and Industry) that it is unlikely to prove economic. This information is contained in a statement, confirming earlier news, which claims that neither the volume nor type of coal required is obtainable in the area.

Manchester Building Exhibition

THE CHEMICAL AGE will be represented on the stand of Benn Brothers, Ltd. (No. 8) at the Building Trades Exhibition to be held in the City Hall, Deansgate, Manchester, from April 18-29.

Small Increase of Chemical Values

The rise of the chemicals and oils price index in 1949—1.7 per cent—was smaller than that of any other commodity group of the index except coal, states the *Board of Trade Journal.*

Prices of Oils and Fats

The Ministry of Food announces that no changes will be made in the prices of unrefined oils and fats and technical animal fats allocated to primary wholesalers and large trade users during the four-week period ending March 4, 1950.

Fall in Coal Output

Deep-mined coal production last week totalled 4,088,300 tons, a drop of 41,500 tons from the week before. Total coal production for the first five weeks of 1950 amounted to 21,281,400 tons, compared with 20,816,600 tons in the corresponding period of 1949.

New £5m. Atomic Plant

Architects and atomic experts are putting final touches to the Ministry of Supply's plans for the £5 million atomic plant at Capenhurst, four miles from Ellesmere Port. Initial construction work may start late in June, but the actual scheme will possibly require three years to complete.

KID Exemptions

The Treasury has made an order exempting the following articles from Key Industry Duty for the period beginning February 9 and ending June 30, 1950: isobutyl alcohol, tertbutyl alcohol, cocaine hydrochloride, cyclohexanol, deca-hydronaphthalene (a hydro naphthalene), diethyl p-nitrophenyl thiophosphate (an ethyl ester), methyl cyclohexanol, methyl cyclohexanone, methylene dichloride.

Praise for Steel Workers

Sir Ellis Hunter, president of the British Iron and Steel Federation has sent a message of congratulation to all steel ingot producers—managements and men—on the excellent start made in the new year. Output for January reached 15.873 million tons, the highest figure ever achieved in this month. In the last week of the month 328,100 tons were produced.

Next Week's Events

MONDAY, FEBRUARY 13

The Royal Institute of Chemistry

Leeds: University, 6 p.m. Prof. W. Bradley: "Chemistry and Medicine."

Institute of Metals

Glasgow: 39 Elmbrook Crescent, 6.30 p.m. (Scottish Local Section). E. J. Bradbury: "The Fabrication of Nickel Alloys."

Institute of Packaging

Manchester: Grand Hotel, 6 p.m. J. J. Cheesman: "The Use of Tensional Steel Strapping in Packaging."

TUESDAY, FEBRUARY 14

Society of Chemical Industry

London: 26 Portland Place, W.1, 6.30 p.m. Dr. K. W. Pepper (Chemical Research Laboratory, DSIR): "Recent Developments in Ion-exchange Resins."

Institution of Chemical Engineers

London: Burlington House, Piccadilly, W.1., 5.30 p.m. "Conference on The Formation and Properties of Gas Bubbles."

Incorporated Plant Engineers

Manchester: Engineers' Club, Albert Square, 7.15 p.m. "Industrial Insulation."

Hull Chemical and Engineering Society

Hull: Church Institute, Albion Street, 7.30 p.m. W. H. Bird: "Pattern For Progress."

Institute of Metals

Swansea: University College, Singleton Park, 6.30 p.m. (South Wales Local Section). Annual general meeting. L. G. Beresford: "Technical Journalism and the Metallurgist."

The Polytechnic

London: Regent Street, W.1, 7.15 p.m. First of series of four lectures. Claud Diamond: "Advances in the Science and Technology of Synthetic Fibres."

WEDNESDAW, FEBRUARY 15

The Royal Institute of Chemistry

London: 30 Russell Square, W.C.1. 6 p.m. (With BAC). T. McLachlan: "The Public Analyst and His Work."

The Royal Society

London: Burlington House, Piccadilly, W.1, 2.15 p.m. Discussion: "The Mode of Action of Local Hormones," opened by J. H. Burn.

Institute of Fuel

Manchester: Engineers' Club, Albert Square, 2 p.m. Walter Goldstern: "The Practical Value of Steam Storage."

Manchester Metallurgical Society

Manchester: Engineers' Club, Albert Square, 6.30 p.m. R. W. N. Danielson: "Hot Pressing of Brasses."

Society of Instrument Technology

Manchester: Reynolds Hall, College of Technology, 7.30 p.m. J. Blears: "The Mass Spectrometer."

Institution of Works Managers

Stockton-on-Tees: Vane Arms Hotel, 7.30 p.m. Film: "Mechanical Handling."

THURSDAY, FEBRUARY 16

The Chemical Society

London: Institution of Mechanical Engineers, Storey's Gate, S.W.1, 7.15 p.m. Pedler lecture. Prof. J. W. Cook: "Polycyclic Aromatic Hydrocarbons."

Aberdeen: Marischal College, 7.30 p.m. (With RIC and SCI). Dr. James Taylor: "Applications of Exothermic Solid Reactions to Jet Propulsion and Industrial Purposes."

Manchester: University, 6.30 p.m. Reading of original papers.

Society of Dyers and Colourists

Leek: (with Leek Textile Society). H. A. Thomas (Courtaulds, Ltd.): "The Dyeing of Narrow Fabrics."

Incorporated Plant Engineers

Liverpool: Radiant House, Bold Street, 7 p.m. F. Latimer: "The Metallurgist and the Plant Engineer."

FRIDAY, FEBRUARY 17

The Chemical Society

Southampton: University College, 5 p.m. (with Southampton University College Chemical Society). R. S. Nyholm: "Modern Inorganic Stereochemistry."

Society of Dyers and Colourists

Manchester: Gas Department showrooms, Town Hall Extension, 6.30 p.m. "Targets for the Dyestuff Manufacturer."

Oil and Colour Chemists' Association

Birmingham: Chamber of Commerce, New Street, 6.30 p.m. Dr. P. D. Ritchie: "Some Aspects of Copolymerisation."

SATURDAY, FEBRUARY 18

Institution of Chemical Engineers

Manchester: Reynolds Hall, College of Technology, 3 p.m. N. Tetlow: "A Survey of Present Day Pumping Practice in the Chemical Industry."

· OVERSEAS ·

Netherlands Streptomycin

Streptomycin is to be manufactured in Holland with the co-operation of a U.S. concern, according to a recent report in *Chemical and Engineering News*. The site will be in Gorichem, where a disused sugar factory is to be converted to a biochemical plant.

U.S. Sulphur Tonnage

Production of native sulphur in the U.S.A. in November totalled 400,564 long tons, a slight increase over the figures for the previous month. Output for the first 11 months of 1949 was 4,352,359 long tons, 78,325 long tons less than the same period of 1948. Producers' stocks have increased by 18,534 long tons to 3,115,865.

Venezuelan Oil Output

Crude oil output in Venezuela during the first nine months of 1949 amounted to 55.65 million cu. m., compared with 57.84 million cu. m. in the same period of 1948. Exports of crude fell to 49.15 million cu. m. from 52.54 million cu. m. Shipments of petroleum derivatives, however, were slightly higher at 3.85 million cu. m. against 3.64 million cu. m.

German Chemical Assets

The Swiss Government is to offer for sale the total share capital (600 shares with a nominal value of Sw. fr. 500 each) of the German-owned Chemisch - Technische Werke AG, of Muttenz, which manufactures asphalt, mineral oils, bitumens, insecticides, etc. The conditions of sale can be obtained from the Swiss Compensation Office, Tabstrasse 62, Zurich, and offers should be submitted before February 28.

Aluminium to Save Dollars

The recommendation that Western Europe should produce and consume more aluminium to save dollars on other metals and materials has been made by the non-ferrous metals committee of the OEEC. The 1952-53 estimated consumption of 508,000 tons is considered too low, according to the committee's report, which forecasts production during the same period as 381,000 tons. In 1955, consumption might be increased to over 650,000 tons and production to 462,000 tons with the help of overseas territories.

Six Chemical Plants for Poland

According to *Przemysl Chemiczny*, Poland's chemical industry will receive from the Soviet Union six complete chemical units in furtherance of the six-year plan. They are a carbide factory, an acetic acid plant, a unit for the manufacture of nitrogen compounds, a soda plant, a factory for the production of sulphuric acid from gypsum, and a plant for the manufacture of synthetic phenol.

Monsanto Sales Nearly $166 Million

Sales of the (U.S.) Monsanto Chemical Company in 1949 were $165,924,000, an increase of $4,315,259 over the sales for 1948. Sales for the fourth quarter of 1949, excluding those of the British and Australian affiliates, amounted to $44,552,559.

U.S. Cottonseed Oil for Germany

More than 450 tank cars of crude cottonseed oil are being concentrated in Houston, Texas, for export shipment to Germany under the Marshall Plan. Derived from Government-owned cottonseed, the shipment will total 13,000 metric tons of crude oil.

Crystallography Congress

The second general assembly and international congress of the International Union of Crystallography will be held from June 27-July 3, 1951, in Stockholm, at the invitation of the Swedish National Committee for Crystallography. By giving ample notice it is hoped that as many crystallographers as possible will be able to make arrangements to attend.

Canada's Domestic Stainless Steel

The installation of Canada's first stainless steel sheet rolling mills has been started by Atlas Steels, Ltd., at its works in Welland, Ontario. Production should begin in September and is expected to free Canada from dependence on imports from the U.S.A. and Britain. The U.S.A. has been supplying 90 per cent of Canada's annual requirements of 2750 tons.

Indian Lac Research

An Indian institute has perfected methods of making shellac by use of an autoclave. The new method eliminates the use of both shellac cloth and charcoal, and requires less labour. The method, which reduces cost of production by about 10 per cent, has been perfected on a laboratory scale, and successfully tried with small-scale pilot plant. New compounds made out of linseed oil and tobacco oil at the institute have been found to give lac good gloss, water resistance and satisfactory adhesive qualities.

ACID PLANT FOR ATHENS

Notable British Contract

A CONTRACT, exceeding £250,000 in value, for a large contact sulphuric acid plant to be supplied to the Hellenic Company of Chemical Products and Fertilisers, Ltd., Athens, was recently secured by the Stockport chemical engineering firm of Simon Carves, Ltd., in competition with Belgian, German and U.S. firms (THE CHEMICAL AGE 62, 139).

A description from the technologists concerned indicates that this plant is designed for the production of 150 tons equivalent of 100 per cent H_2SO_4 per day as 94 per cent acid, and 30 per cent oleum. The raw material will be Cassandra pyrites with approximately 48 per cent available sulphur, which will be roasted in flash roasting equipments of Nichols-Freeman design, into which the finely ground dried pyrites is injected with preheated air.

The roaster auxiliary equipment comprises pyrites handling by shovel, feeding to the boot of an elevator which delivers to an overhead steel bunker for service storage of the raw pyrites. A variable belt feeder takes the moist pyrites to a dryer, from which the dry pyrites is then conveyed to the dry pyrites bunker.

Pulverising

A ball mill treats the dry pyrites, reducing it to dust, the system being a closed circuit with classifier and cyclone. The finely ground pyrites is lifted to the ground pyrites bunker, from which the product is automatically fed to the main air stream for injection to the roaster.

Combustion takes place at high efficiency, resulting in an exit cinder containing not more than one per cent sulphur. The cinders are conveyed away from the numerous off-take chutes by water-cooled, push-pull conveyors, for subsequent disposal.

The roaster is followed by a waste heat boiler producing steam, which will be employed for power generation in a turbo-alternator. Up to 1½ tons of steam can be generated per ton of pyrites roasted, and the steam will be superheated in superheaters provided with the waste heat boiler and in the converters.

The dust is removed from the gas stream by cyclones and electrostatic precipitators of standard Simon-Carves design, pro-

(*continued at foot of next column*)

vided with Ferranti/Simon-Carves shock-proof high tension equipment and switchgear. Leaving the dust precipitators, the gas passes to the cooling and purification plant, comprising cooling tower with weak acid recirculation and cooling system, for the removal of arsenic and residual dust. From the coolers the gas goes on to the Simon-Carves electrostatic mist precipitators before entering the drying tower, which is under suction from the blower.

All water is removed at this stage and the cold dry gas is blown forward to the oxidation unit of standard Monsanto/Simon-Carves design, comprising converter and heat exchangers. Absorber and oleum tower are provided with the customary auxiliary strong acid recirculation and cooling equipment.

A large part of the plant is in the open, but buildings will be provided to house the blowers and instrument panel, the furnaces, boilers, dust precipitators and rectifiers.

LABORATORY GLASSWARE

Avoiding Centrifugal Breakdown

ORDINARY commercial glassware is not always able to stand up to the high stresses frequently set up in centrifuging machines. The causes of such failure have been the object of special study by Measuring and Scientific Equipment, Ltd., London, and a guaranteed centrifuge-tested glass has now been produced.

It is stated that all the tubing used is specially selected, of uniform wall thickness, free from striae and other irregularities and inspected to a specification developed in co-operation with the British Medical Research Council.

During manufacture uniform wall thickness is maintained, all ends being ground and fire polished. Care is taken to see that the annealing is carried out efficiently, and all tubes are tested for strain by polarised light and re-checked for uniform wall thickness.

In each batch, 5 per cent is tested centrifugally at an RCF equal to the maximum required for that particular type of tube when using MSE machines and using a fluid of specific gravity 1.2.

Two qualities of this glassware are available, soda glass and heat resisting. This specially made and selected glassware is slightly more expensive than the ordinary commercial type.

The Stock and Chemical Markets

BUSINESS in stock markets has further declined and was affected earlier in the week by a reaction in British Funds, following dealings in the new Southern Rhodesia loan. The premium on this was only 5s., although £1 had been generally expected a week ago.

Industrial shares showed a majority of small declines, but movements generally have not exceeded more than a few pence. Attention drawn to the chemical industry's plans for expansion helped to keep chemical shares steady. Nevertheless, as in most other sections, buyers have continued to hold off until the General Election result.

Imperial Chemical again changed hands around 41s. 3d., reflecting continued confidence that the 10 per cent dividend is likely to be maintained and the assumption that when more capital is required, shareholders are likely to have preferential terms of allotment. Albright & Wilson remained around 29s. Laporte Chemicals 5s. ordinary were still around 9s. 6d., further expansion of the company's business being expected. Monsanto 5s. ordinary were 50s. 9d., and Brotherton 10s. shares remained at 19s. 3d. Amber Chemical 2s. shares were 4s. 9d., F. W. Berk 14s. 3d., and Boake Roberts 5s. shares 25s. 6d.

Bowman Chemical 4s. shares stayed at 5s. 3d., Pest Control 5s. ordinary were 7s. 9d., and Thomas Tilling moved up to 23s. following the deal whereby the company has purchased from Pilkington Brothers for over £1 million a 60 per cent interest in James A. Jobling. Triplex Glass have been steady around 18s., helped by the news of growth of the company's export business. British Glues 4s. shares further improved to 20s. 3d.

There has been a better trend in Lever & Unilever following their recent set-back, the price improving moderately to 40s. 3d., while Lever N.V. were 41s. British Aluminium held their improvement to 40s. and British Oxygen were higher at 92s. 3d., but Borax Consolidated (55s.) have not recovered from an earlier reaction. United Molasses at 39s. 6d. were easier, profit-taking following an earlier rise.

British Xylonite, at 57s. 6d., have been steady, while De La Rue were 23s., and British Industrial Plastics 2s. shares at 4s. 6d. have been firm. Elsewhere, Associated Cement further eased to 73s. 3d., but a number of paint shares became firmer, Lewis Berger being 25s. 1½d. Pinchin Johnson have changed hands around 36s. 3d. Fisons have come back sharply to 24s. because of the chairman's hint of new capital plans, although it is realised that more capital is unlikely to be raised until later in the year.

Boots Drug have strengthened from 47s. 6d. to 48s., and the 4s. units of the Distillers Co. showed firmness at 17s. 6d. Oils were firmer, there being hope of a compromise on the decision to "cut" oil imports from the dollar countries. Shell were 65s., Anglo-Iranian £6 11/16, and Trinidad Leaseholds 21s. 9d.

Market Reports

ACTIVITY on the industrial chemicals market continues to be well maintained and contract deliveries to consumers, particularly the textile and plastics industries, have covered good volumes. Buyers are having no difficulty placing new business for spot or nearby delivery and this applies to most sections of the market. The de-control of sulphuric acid distribution is not expected to have much effect on consumption. The product is still price controlled and high haulage charges will probably operate against long distance deliveries. The volume of inquiry for shipment is again satisfactory. With regard to the coal tar products there has been a good call for pitch, with fair quantities being shipped to the continent. Offers of naphthalene are quickly taken up and there is an active market in the light distillates. The demand for creosote oil is quietly steady and a fair export business to U.S.A. has been reported.

MANCHESTER.—Good deliveries of the alkalis and other leading chemical products are being taken up by the textile and allied trades and other consumers, while a steady flow of replacement business covering a fairly wide range has been reported on the Manchester market during the past week. This has included both home-trade orders and export buying. Little important change in the price position has occurred and the undertone of the market is strong in almost all sections. Superphosphates and certain other fertiliser materials have been rather more active. A fairly steady movement of supplies is reported in the tar products market.

GLASGOW.—Turnover in the Scottish chemical market has generally attained

(continued on page 244)

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

LAFARGE ALUMINOUS CEMENT CO., LTD., London, W. (M., 11/2/50.) Order of Court dated December 14, 1949, amending particulars relating to supplemental trust deed dated March 25, 1949, and reg. April 11, 1949, by substituting the word "nil" for the figure of £25,000. (This figure is that given in the original particulars as being the amount of deb. stock then issued); also December 22, £25,000 first deb. stock part of an amount already reg. *£138,890. Nov. 3, 1949.

SHEPPY GLUE & CHEMICAL WORKS, LTD., Horley. (M., 11/2/50.) December 30, deb., to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; general charge. *£14,880. April 14, 1949.

Satisfaction

EVANS MEDICAL SUPPLIES, LTD. (formerly Evans Sons Lescher & Webb, Ltd.), Liverpool. (M.S., 11/2//50.) Satisfaction January 11, of deb. stock reg. March 12, 1943, to the extent of £12,000.

New Registrations

Bowdler and Bickerdike, Ltd.

Private company. (477,670). Capital £10,000. Manufacturers of chemicals and chemical preparations, cements, oils, paints, etc. Directors: H. E. J. Cory and C. Cory. Reg. office: Eagle Chemical Works, Church, nr. Accrington.

Isotope Developments, Ltd.

Private company. (477,928). Capital £25,000. Objects: to develop and turn to account the use of radioactivity and the use of radioactive and stable isotopes and radiations which are emitted or caused by them, etc. Solicitors: Slaughter and May, 18 Austin Friars, E.C.2.

R. V. Jones, Ltd.

Private company. (477,748). Capital £2000 in £1 shares. Manufacturers of chemical engineering plant. Directors: R. V. Jones, D. J. Jones, J. D. W. Jones. Reg. office: 521 Kingsbury Road, N.W.9.

P.C. Products (Overseas), Ltd.

Private company. (477,777). Capital £100. Manufacturers of chemicals and chemical products. Directors: J. Benjamin, M. E. Stiller. Reg. office: 110 Stainbeck Lane, Leeds, 7.

South Western Detergents, Ltd.

Private company. (477,782). Capital £2000. Manufacturers of detergents, cleansing materials and compounds, soap, etc. Directors: W. G. Macnamara and A. R. Macnamara. Reg. office: Central House, 9 Exeter Road, Exmouth.

Company News

Pest Control, Ltd.

At the first annual general meeting of the company it was made known that profits for the year ended September 30, 1949, were £100,045—nearly twice the 1948 total. A resolution was passed increasing the capital of the company to £1.25 million by the creation of one million 5s. ordinary shares. The Treasury's consent was awaited for the creation of £500,000 seven-year 5 per cent secured stock, of which £300,000 is to be issued for cash at par.

Increase of Capital

The following increase in registered capital has been announced: Scott and Bowne, Ltd., from £120,000 to £250,000.

THE STOCK AND CHEMICAL MARKETS

(*continued from page 243*)

normal levels. In general, the supply position is being well maintained and prices are reasonably stable, despite one or two increases and a few small decreases. There is still a very considerable shortage of coal tar products, particularly xylol, which is holding up production in a number of factories. The export market has been much more active than for some time and a number of orders have been booked for shipment to Europe.

Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2, at 2s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Plasticised synthetic resin compositions.—G. L. Martin Co. July 26 1943. 633,939.

Heat-resistant alloys.—G. R. Shepherd. (Westinghouse Electric International Co.). Aug. 23 1946. 633,833.

Process and apparatus for making carbon black.—A. H. Stevens. (G. L. Cabot, Inc.). Oct. 29 1946. 633,945.

Process for obtaining insecticide substances in a high grade of dispersion or pulverisation, through the incorporation of carbon dioxide.—C. R. Pla. Nov. 27 1945. 633,844.

Rubber derivatives and processes for their production.—Dunlop Rubber Co., Ltd., F. A. Jones, and G. A. Truesdale. Nov. 22 1946. 633,846.

Manufacture of siloxane resins.—Dow Corning Corporation. Jan. 21 1946. 633,849.

Method of producing higher molecular weight alcohols.—Soc. Anon. d'Innovations Chimiques Sinnovia Ou Sadic. June 28 1946. 633,864.

Processes of producing agglomerated sodium hexametaphosphate and the product resulting therefrom. — Monsanto Chemical Co. June 7 1946. 633,952.

Isoquinoline derivatives.—Kodak, Ltd. April 19 1946. 633,874.

Synthetic resinous materials.—British Thomson-Houston Co., Ltd. April 30 1946. 633,876.

Production of oil from oil-bearing protein material of animal origin.—General Foods Corporation. May 26 1942. 633,953.

Manufacture of alkali metal cyanides.—W. H. Groombridge, and W. Hunter. May 8 1947. 633,882.

Emulsions for combating noxious organisms.—N.V. De Bataafsche Petroleum Maatschappij. Dec. 20 1945. 633,885.

Calcium phosphate phosphors.—British Thomson-Houston Co., Ltd. July 15 1946. 633,891.

Preparation of derivatives of cyclohexene.—Glaxo Laboratories, Ltd., Sir I. M. Heilbron, and E. R. H. Jones. July 16 1947. 633,892.

Preparation of ketonic derivatives of cyclohexene.—Glaxo Laboratories, Ltd., Sir I. M. Heilbron, and E. R. H. Jones. July 16 1947. 633,893.

Manufacture of hydrogen peroxide.—H. E. Alcock. July 22 1947. 633,782.

Process for the manufacture of calcium-salts of phosphorylated arabonic acid and derivatives thereof.—Roche Products, Ltd. March 30 1945. 633,967.

Process for the preparation of concentrated rubber dispersions.—Nederlandsch-Indisch Instituut Voor Rubberonderzoek. Aug. 14 1946. 633,904.

Stabilisation of polysulphone synthetic resins.—British Celanese, Ltd. Aug. 13 1946. 633,786.

Apparatus for separating grease, oils and fats from waste water. R. H. Newman, and M. P. Hirshstein. Oct. 4 1938. 633,905.

Preparations comprising esters of arylcarbamic acids.—I.C.I., Ltd., and F. Dawson. Aug. 25 1947. 633,970.

Preparation of alkynyl-alkenyl-carbinols.—I. M. Heilbron, and E. R. H. Jones. Sept. 26 1947. 633,772.

Organo - polysiloxane compositions.—Westinghouse Electric International Co. Oct. 30 1946. 633,973.

Preparation of chlorinated dinitrobenzenes.—Glaxo Laboratories, Ltd., E. T. Borrows, and J. C. Clayton. Oct. 28 1947. 633,977.

Preparation of seaweed for industrial purposes.—J. A. Kelly. Dec. 24 1946. 633,798.

Recovery of alcohols from mixtures containing same.—Shell Refining & Marketing Co., Ltd., and P. J. Garner. Oct. 28 1947. 633,979.

Process for making sorbic acid esters.—Carbide & Carbon Chemicals Corporation. Nov. 5 1946. 633,800.

Process for the manufacture of N-disubstituted-aminoalkyl diaryl-chloro-thioacetates and derivatives thereof.—Roche Products, Ltd., A. L. Morrison, and M. Konigstein. Nov. 18 1947. 633,922.

Production of water-insoluble threads or like products of cyanoethyl ethers of cellulose.—Courtaulds, Ltd., J. H. MacGregor, and C. Pugh. Dec. 1 1947. 633,807.

Catalytic aromatic alkylation processes.—Anglo-Iranian Oil Co., Ltd., and J. Habeshaw. Dec. 6 1947. 633,985.

Manufacture of resins from aldehydes and aromatic hydrocarbons.—Dorman, Long & Co., Ltd., T. G. Woolhouse, and W. Lunn. Dec. 16 1947. 633,923.

Process for the manufacture of maleic anhydride.—Beck, Coller & Co. (England), Ltd. Aug. 25 1947. 633,814.

Moulding plastic materials by extrusion. —R. Colombo. Feb. 5 1940. 634,071.

Distilling bituminous material to make coke.—A. H. Stevens. (Pittsburgh Coal Carbonisation Co.) Nov. 1 1945. 634,150.

Poly-N-vinyl pyrrole compounds moulding composition and process.—General Aniline & Film Corporation. Feb. 2 1945. 634,077.

Process for the recovery of ammonia from ammonia-containing gas.—Koppers Co., Inc. Nov. 8 1945. 634,153.

Hydrogenolysis of 2-alkyl substituted furans.—I.C.I., Ltd., J. G. M. Bremner, D. G. Jones, and R. R. Coats. March 28 1947. 634,080.

Hydrogenation of cyclic organic compounds.—I.C.I., Ltd., J. G. M. Bremner, and F. Starkey. July 7 1947. 634,089.

Process of preparing selenium to which is added small quantities of substances for the purpose of increasing its conductivity. —N.V. Philips' Gloeilampenfabrieken. Sept. 27 1946. 634,167.

Copper catalysts.—I.C.I., Ltd., P. W. Reynolds, and J. W. Donaldson. Oct. 1 1947. 634,097.

Process for carrying out vapour phase chemical reactions in the presence of a suspended catalyst.—J. C. Arnold. (Standard Oil Development Co.) Nov. 19 1946. 634,102.

Polyamide condensation polymers.—Wingfoot Corporation. Nov. 21 1946. 634,172.

Insecticidal composition.—S. G. Dehn. (Stauffer Chemical Co.) Dec. 17 1946. 634,175.

Process for the manufacture of a detergent product as a substitute for soap.—J. De La V. Samper. Jan. 13 1947. 634,179.

Methods of making insulators and ceramic compositions.—C. E. Every. (Titanium Alloy Manufacturing Co.) Jan. 23 1947. 634,181.

Manufacture of silica gel-containing catalysts.—J. C. Arnold. (Standard Oil Development Co.) Jan. 28 1947. 634,182.

Esters of polyoxyalkylene diols and methods of making such esters.—Carbide & Carbon Chemicals Corporation. Feb. 26 1946. 634,183.

Production of fluoroacetic acids and derivatives thereof.—I.C.I., Ltd., J. W. C. Crawford, and E. R. Wallsgrove. Feb. 16 1948. 634,188.

Manufacture of silver and bismuth nitrates.—Johnson & Sons' Smelting Works, Ltd., and T. Critchley. Feb. 4 1948. 634,189.

Method of reducing the formation of foam in liquids and preparations therefor. —Ciba, Ltd. April 1 1947. 634,197.

Process for the catalytic hydroxylation of olefinic compounds.—N.V. De Bataafsche Petroleum Maatschappij. April 10 1947. 634,118.

Processes of preparing polyvinyl acetate emulsions.—A. H. Stevens. (Shawinigan Resins Corporation.) March 12 1948. 634,216.

Process and apparatus for the continuous crystallisation of tar oils, naphthalenic anthraenic and like oils.—Soc. Per Azioni Vetrocoke. June 10 1947. 634,225.

Method of producing synthetic, water-insoluable viscous liquid thermosetting resins, and the products resulting therefrom.—Quaker Oats Co. July 3 1947. 634,126.

Separation of delta-tocopherol from vegetable oils.—Distillation Products, Inc. July 7 1947. 634,128.

Process of producing a colloidal lead iodide.—A. Dinsley. July 17 1947. 634,233.

Polyamides.—E. I. Du Pont de Nemours & Co. July 21 1947. 634,235.

Pyridazone derivatives and method of preparing the same.—General Aniline & Film Corporation. July 25 1947. 634,236.

Production of dextran.—East Anglia Chemical Co., Ltd., A. R. Lockwood, and G. Swift. May 28 1948. 634,129.

Manufacture of asymmetrical urea derivatives of monoazo-dyestuffs.—Ciba, Ltd. Aug. 12, 1947. 634,130.

Process for the production of dichloropropylenes.—N.V. De Bataafsche Petroleum Maatschappij. Dec. 17 1947. 634,137.

Production of hydrolysed ethylene interpolymers.—I.C.I., Ltd. Feb. 24 1948. 634,140.

Manufacture of an ester of nicotinic acid. —Ciba, Ltd. March 11 1948. 634,033.

Manufacture of acetaldol.—Usines De Melle. March 27 1945. 634,562.

Manufacture of aldols.—Usines De Melle. April 6 1945. 634,563.

Aluminium base alloys.—Trefileries et Laminoirs Du Havre, G. Chaudron, and J. Herenguel. Aug. 14 1945. 634,492.

Process for making dry starch preparations soluble in cold water.—N.V. W. A. Scholten's Chemische Fabrieken. May 3 1946. 634,368.

Modified resin compositions.—L. Berger & Sons, Ltd. June 3 1946. 634,570.

Process for the preparation of 2 : 4-dichloro-1-amino-anthraquinone. — S. G. Bedekar, and K. Venkataraman. Aug. 26 1946. 634,646.

Polymerisation in aqueous dispersion of polymerisable organic compounds.—B. F. Goodrich Co. Sept. 5 1946. 634,647.

Glass-to-metal seals.—British Thomson-Houston Co., Ltd., and W. J. Scott. July 27 1948. 634,657.

CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order

THE CIVIL SERVICE COMMISSIONERS invite applications for appointments as **SENIOR SCIENTIFIC OFFICER** and **SCIENTIFIC OFFICER**, to be filled by competitive interview during 1950. Interviews began in January and will continue throughout the year, but a closing date for the receipt of applications earlier than December, 1950 may eventually be announced. Successful candidates may be appointed immediately. The posts are in various Government Departments and cover a wide range of scientific research and development in most of the major fields of fundamental and applied science. Candidates must have obtained a university degree in a scientific subject (including engineering) or in Mathematics with first or second class honours, or an equivalent qualification, or possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience. Candidates for Scientific Officer posts taking their degrees in 1950 may be admitted to compete before the result of their degree examination is known.

AGE LIMITS– For Senior Scientific Officers, at least 26 and under 31 on 1 August 1950; for Scientific Officers, at least 21 and under 28 (or under 31 for established civil servants of the Experimental Officer class) on 1 August, 1950.

SALARY SCALES for men in London : Senior Scientific Officers : £700×25–£900; Scientific Officers, £400×25–£650. Rates for women are somewhat lower.

Further particulars from the Secretary, Civil Service Commission, (Scientific Branch) 7th Floor, Trinidad House, Old Burlington Street, London, W.1, quoting No. 2887.

4993/200.

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3. **PHYSICAL CHEMIST** with good grounding in modern physical methods and with bent for mathematical work.

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Rates for women somewhat lower. Posts are unestablished but carry F.S.S.U. benefits. Application forms obtainable from Technical and Scientific Register (k), York House, Kingsway, W.C.2., quoting F.90/50a. Closing date, March 18, 1950.

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